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The Public Lighting Tables of the American Meter Company will be found in the page advertisement of that Company.

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[OFFICIAL NOTICE.]

Second Annual Meeting, American Gas Institute.

AMERICAN GAS INSTITUTE,
OFFICE OF THE SECRETARY,
NEW ALBANY, IND., Sept. 11, 1907.

To the Members, American Gas Institute: The second annual meeting of the American Gas Institute will be held at Washington, D. C., October 16, 17 and 18, and will be called to order by the President, Walton Clark, of Philadelphia. The New Willard Hotel has been chosen as headquarters, and the sessions will be held in the auditorium thereof.

The following schedule of rates offered by various hotels in Washington are submitted:

		Without Bath — One Person. Single Room.	Without Bath — One Person. Double Room.	Without Bath — Two Persons. Double Room.	Without Bath — Two Persons. Extra Large Room.	With Bath — One Person. Single Room.	With Bath — One Person. Double Room.	With Bath — Two Persons. Double Room.	With Bath — Two Persons. Extra Large Room.
New Willard.	E	$2.50 up.	$3.00 up	....	$4.00 up.	$3.50 up.	$4.00 up.	$5.00 up.	$5.50 up.
Raleigh	E	2.00	3.00	4.00	4.00	3.00	4.00	4.00	6.00
		....	....	....	....	3.50		6.00	up.
Occidental.....	E	Suites, 2 bedrooms, Parlor and bath, $4 and $5							
Shoreham	E	2.00	3.00	4.00	5.00	3.00	4.00	5.00	7.00
	A	4.00	5.00	8.00	9.00	5.00	6.00	9.00	11.00
Arlington	E	2.00	....	4.00	4.00	3.00	...	5.00	5.00
	A	4.00	....	4.00	8.00	5.00	....	9.00	9.00
Normandie ...	E	1.50	2.00	2.00	2.50	2.00	3.00	4.00	4.00
	A	3.00	3.50	5.00	6.00	3.50	5.00	8.00	8.00
Riggs House..	A	3.00	3.50	6.00	7.00	4.00	5.00	8.00	10.00
Grafton	A	3.00	3.50	6.00	.....	5.00	6.00	8.00	....
		....	5.00	8.00	....	....	....	9.00	....
Cochran.....	A	....	.....	.	...	....	4.00	7.00	....
Metropolitan..	E	1.00	2.00	2.00	3.00	2.00	2.50	4.00	6.00
		..	....	....	....	..	3.00		up
	A	2.50	3.00	5.00	6.00	3.50	4.00	7.00	8.00 up
Ebbitt	A	3.00	....	6.00	....	5.00	6.00	10.00	....
		4.00	....	up	....	....	....	....	....
St. James. ...	E	1.00	2.50	3.00	....	2.50	3.00	4.00	....
		2.00	4.00	4.00	.....	3.00	4.00	6.00	....
National.. ...	E	1.00	2.00	2.50	3.00	2.00	....	4.00	....
						2.50	....	....	....
		2.50	3.00	5.00	6.00	3.50	....	7.00	....
		....	....	....	....	4.00	....	....	....
Howard House	E	2.00	....	2.00	6.00	....	....	....	....
		2.00	.....	2.50	....	....	....	....	....

E—European Plan. A—American Plan.

The following order of proceedings will be adhered to as far as possible:

WEDNESDAY, OCTOBER 16TH.—MORNING SESSION, 10 TO 12 M.

Address of Welcome; by Hon. H. B. MacFarland, President of the Board of Commissioners, District of Columbia.

Reply by—— —— ——.

President's Address.

Report of Board of Directors.

Report of Trustees, Gas Educational Fund.

LIBRARY OF CONGRESS SEP 30 1907 SMITHSONIAN DEPOSIT

"The Obligations Imposed by the Possession of a Franchise," by Mr. Charles H. Dickey.

Report of Nominating Committee.

AFTERNOON SESSION, 2 to 4:30.

"Depreciation;" by Dr. A. C. Humphreys.

Communication from New England Association of Gas Engineers; by Its Committee on Uniform Accounting and Depreciation.

Report of Public Policy Committee; Mr. E. G. Cowdery, Chairman.

Report of Committee on Rates; Mr. W. H. Gardiner, Chairman.

THURSDAY, OCTOBER 17TH.—MORNING SESSION, 10 to 12 M.

Report of Committee on Methods of Taking Candle Power; by Mr. W. H. Gartley, Chairman.

"Instructions for Operating Recuperative Benches;" by Mr. W. A. Baehr.

"Experiments in Carbonization;" by Mr. W. H. Fulweiler.

Report of Board of Revision of the Question Box on "Manufacture of Gas;" by Mr. J. D. Shattuck, Chairman.

Report of Committee on Economic Balance between Calorific Value and Candle Power; Mr. T. D. Miller, Chairman.

AFTERNOON SESSION.—2 to 4:30.

Report of Committee on Electrolysis; Mr. A. G. Glasgow, Chairman.

Lecture on "Electrolysis;" by Prof. A. F. Ganz.

Report of Committee on Pipe Standards; Mr. Walton Forstall, Chairman.

Report of Bureau of Information, Mr. W. H. Gartley, Chairman.

FRIDAY, OCTOBER 18TH.—MORNING SESSION, 10 to 12 M.

"Air Blast Gas Appliances," by Messrs. W. K. Eavenson, Philip Cross and W. H. Allen.

Report of Committee on Uniformity of Meters; Mr. C. H. Dickey, Chairman.

Report on "A" Meter Results from Philadelphia, Kansas City, Mo., and Kansas City, Kas.

Experiences with Dipping Meters.

AFTERNOON SESSION.—2 to 4:30.

Wrinkle Department, by Mr. M. R. Bump, Editor.

The remainder of this session is reserved for any papers or reports, time for which may not be found according to the programme as above outlined, and for any other business that may come up.

The Passenger Associations, on account of State legislative enactments of 2-cent rates, have refused to grant reduction rates on certificate plan for persons attending the convention, which in substance is the same as received from other Passenger Associations, as follows:

NEW YORK, SEPTEMBER 23, 1907.

MR. JAS. W. DUNBAR, Sec. American Gas Institute, New Albany, Ind.:

Dear Sir—Referring to your favor of the 31st ult., and previous correspondence, beg to advise that your application for reduced rates, account above occasion, was carefully considered by the Trunk Lines at their meeting yesterday, but in view of the unsettled rate conditions throughout the country they deemed it inexpedient to grant any concession.

Yours truly,
L. P. FARMER, Commissioner.

Mr. Charles H. Dickey, Chairman of the Committee of Arrangements, announces as follows:

"The arrangements that the Committee have made for the meeting in Washington are: An excursion for the ladies on Thursday to the Great Falls of the Potomac, where luncheon will be served. Should it rain that day the trip will be abandoned and a luncheon will be served in the city. Thursday evening there will be a theater party for the ladies. The banquet will be held Thursday evening in the New Willard, and the charge for same, to include everything complete, will be $7.50. Members accompanied by ladies will be assessed $2.50 for each lady in their respective parties."

The Secretary will be pleased to mail applications to those who may wish to become members of the Institute. Further detailed information in reference to the convention will be forthcoming.

Yours truly, JAMES W. DUNBAR, Secretary.

[NOTICE.]

Wrinkle Department, the American Gas Institute.

To the Membership, American Gas Institute: All members of the American Gas Institute, and others interested, are requested to contribute a description of any novel device or scheme covering any feature of the gas business. Every department of every company uses some novel stunt which would be of value to others. The object of this department is to compile such information. The value of the report depends entirely on the co-operation received. Send in your contribution at once to

MILAN R. BUMP, Editor,
60 Wall street, New York.

BRIEFLY TOLD.

THE MICHIGAN MEETING.—As was predicted would be the case in our issue for last week, the Battle Creek meeting of the Michigan Gas Association was in every sense a success. The technical sessions and the outing hours were valuable and enjoyable, and so were valued and enjoyed. The officers elected were:

President—Mr. David H. Frazer, Battle Creek.
Vice-President—Mr. James T. Lynn, Detroit.
Secretary and Treasurer—Mr. Alonzo K. Ewing, Kalamazoo.

The bustling city of Kalamazoo was chosen as the next meeting place, and the membership roll was largely added to. The spirit that pervaded the gathering was of the sort which is sure to cause the Associatton to enlarge its field and go on to greater good for the lighting industry of the great State with which its activity is most concerned. In fact, this paragraph from the inaugural message of President Dewey (whose direction of the proceedings, by-the-way, was of the masterful sort) is all to the truth: "The work of the Michigan Gas Association in the past has in many respects been a model for other Associations of like character. The work of the Association has not been confined to the reading of papers on the convention floor; for it is the pioneer in Gas Scholarship work of the State educational institutions of this country. It has continued that work, not only with ample means but by personal direction and hearty co-operation." In fact, if the Association had taken no other step than that which advanced the going on of its Gas Scholarship in the State University, it would have ample cause for compliment over its celerity in heading the procession.

THE FIFTEENTH MEETING OF THE PACIFIC COAST GAS ASSOCIATION.—Although, through the courtesy of Secretary John A. Britton, of the Pacific Coast Gas Association, we are enabled in the JOURNAL for this week to give much of the technical matter that was gone through with at the Coast meeting the week before last, we have not received up to the time of writing (Thursday) any connected account of the sessions. From the programme to hand, however, there was promised a plenty of good things, and there is no reason whatever for doubting that every promise was fulfilled. The card was to have carried over a 3-day session, and there was sufficient matter gazetted to cause every day to be a busy one. The banquet was set for the evening of September 19th, and the main figure for the following day was a visit to the large, modern plant of the Santa Cruz Portland Cement Company. The Association was to have been on that visit under the guidance of Mr. W. J. Dingee. Santa Cruz, the place where the meeting was held, is known the world over for its beauty, and it was fitting that in such a haven the members should hold reunion and rejoicing. Last year their fraternizing was in sorrow and perturbation over the calamity that actually cast a pall over the civilized world, albeit there was none of whimpering and whining. To the contrary, there was courage; but this year the moving feeling was of thankfulness, well upheld by the knowledge that in the direful times no lack of thought or deed was shown to prove that disaster was the prelude to a safe rebuilding.

CURRENT COMMENT.—

THE differences between the authorities of Bellows Falls, Vt., and the projectors of the Bellows Falls Gas Company have been satisfactorily adjusted and it is said that the long delayed construction scheme will go forward at once. And the summer at an end!

AT the annual meeting of the Amherst (Mass.) Gas Company the officers elected were: President, E. D. Marsh; Treasurer, C. F. Deuel; Auditor, F. C. Sherwin. The Company enjoyed a very prosperous year, and a committee (consisting of Messrs. Marsh, Hills and Berry) was named to formulate plans for the enlargement, if not the reconstruction, of the gas plant.

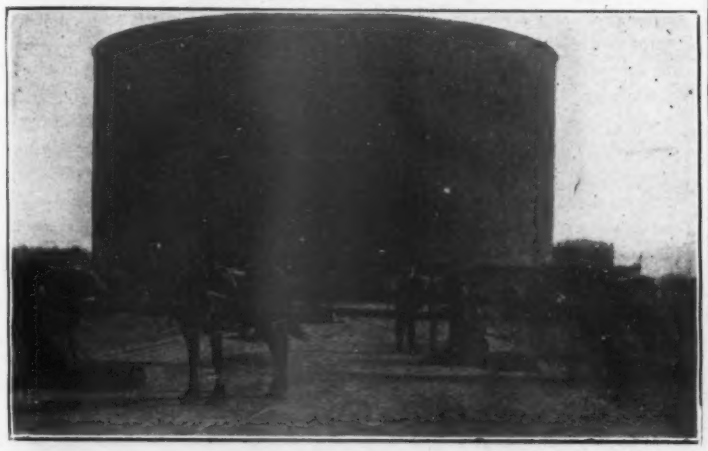
LAST week there was an explosion in the purifying room of the works of the Perth Amboy (N. J.) Gas Company that unhappily caused the death of one workman and the inflicting of painful injury to another. It seems that a purifying box had just been filled with new oxide and the cover was being adjusted thereon, when an explosion occurred that was sufficiently violent to badly damage the building and wreck the boxes. A careful study of the happening seems to support the theory that the igniting spark or flame came from a bunch of foul oxide brought to life by a rather prolonged quickened current of air. There was no evidence of flame nearby. The plant is shut down, but practically no great inconvenience was noted in the lack of gas supply, for the high pressure main between Elizabeth and Perth Amboy, which was laid down some months ago, was immediately put in commission. The result of the inquest, in so far as the testimony is concerned, is awaited with interest.

Moving a 30,000-Barrel Oil Tank by Water.

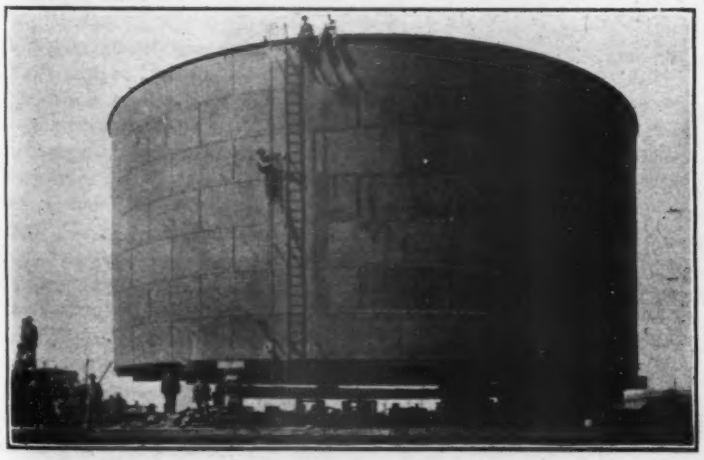
[A paper prepared for the Fifteenth Meeting, Pacific Coast Gas Association.]

A unique problem in engineering confronted the gas department of the California Gas and Electric Corporation a few months since, when it was desired to move a 29,500-barrel iron oil tank from the old gas plant of the San Francisco Gas and Electric Company, at North Beach, to the plant of the Oakland Gas Light and Heat Company, on the Oakland estuary. Many plans were considered and abandoned, such as cutting it in sections in different ways, etc.; but the cheapest method by half, with the manner in which it was finally solved and the work accomplished, is set forth in the accompanying photographs.

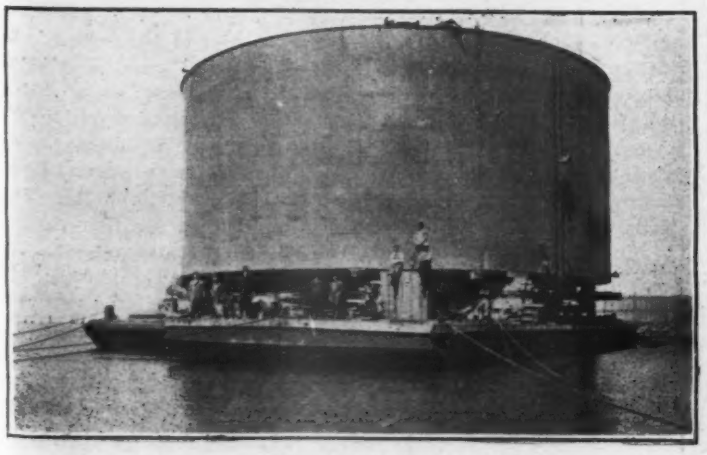
The tank has a wooden cover which is securely fastened to the upper sheets, and supported from the bottom by forty 6 by 6 uprights, serving to make it more rigid and able to resist buckling. To begin with, holes were dug in the masonry foundation in about 20 places around the tank to receive the jacks; then, very carefully and evenly, the tank was raised until it was up to a point where more timbers and jacks could be got under the bottom, and the sag, which to our surprise was only from 4 to 5 inches, taken out and the whole raised high enough to get the cribbing and large timbers in place.



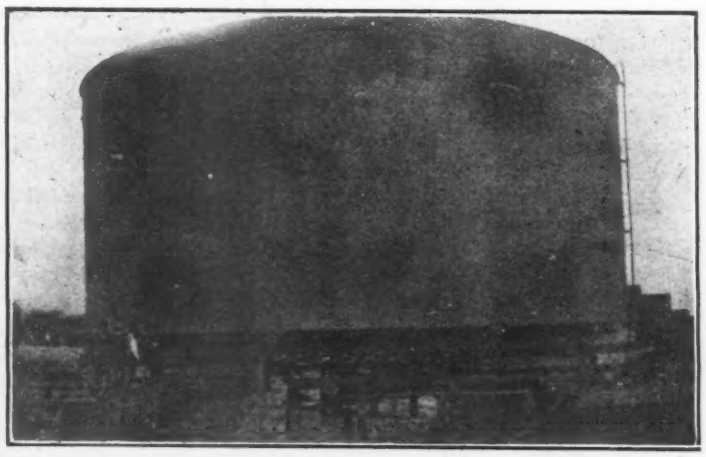
Photograph "A."



Photograph "B."



Photograph "C."



Photograph "D."

It was then handled in the same manner as a house, taken about a mile through the streets, around one corner, and to the water's edge; and it is interesting to note that at one point, where it was taking up not only all the street but all the sidewalk as well, the tank cleared the houses on either side by only about 3 inches and covered their porches completely.

When all was ready in Oakland, two large barges, about 100 feet long, were lashed together and the tank run aboard at high tide on June 30th, 1907, as shown in photographs "B" and "C," the actual time for the work being 1 hour and 20 minutes.

The next day proving to be free from wind, the voyage across the bay was commenced at 9:15 A.M., in tow of a steam tug, while another tug stayed alongside to render assistance in case of need. By 1 o'clock the 10-mile journey across the bay and up the channel was finished, and the barges tied to the bulkhead ready to be unloaded. An incident of the trip was that the captain of the ferryboat "Oakland," seeing that the wash of his boat might give us trouble, stopped his boat to let the tank pass, and the late commuters were treated to a novel sight.

The original plan of unloading was to bring the barges up to the bulkhead opposite the foundation at high water and sink them. It was found necessary, however, to dredge this place before the tank could be brought over, thus forcing the work of unloading to be done from tide water, and this was accomplished as follows:

Two double rows, of 3 piles each, were driven between the bulkhead and deep water, about 40 feet apart, capped and cross-timbered; and at high tide again, all being in readiness and the barges securely lashed to the piles, the big tank was started on the rollers, as seen in photograph "D," and in 45 minutes was resting securely again on land.

After being run into position on its new foundation, the reverse operation used in lifting was begun; it was lowered evenly, the last timbers were taken out when a little over 1 foot from the foundation, and supported only from the outer rim by 20 jacks set in holes left for the purpose in the edge of the foundation. When all were out the jacks supporting it were lowered and the job was completed. Before lowering the bottom was carefully coated with tar paint to protect it against moisture, as was also the top of the foundation.

The tank is 80 feet 1 inch in diameter by 33 feet high, and holds 1,239,189 gallons. The weight is approximately 172,000 pounds, or 86 tons, and although everything went without a hitch, and not a thing happened to cause the least concern, the tank being perfectly tight when tested, everyone breathed a sigh of relief when it left its unnatural element and was again on terra firma.

Repairing the Cup of a 2-Lift, 500,000 Cubic Feet Gasholder.

[A paper read by MR. GEO. S. COLQUHOUN, of San Francisco, at the Fifteenth Meeting, Pacific Coast Gas Association.]

There is at the Potrero Station of the San Francisco Gas and Electric Company, a 500,000 cubic feet, 2-lift holder used for storage purposes, which was built in 1874, and the grip on the lower lift of this holder had, from long use, become badly corroded just above the water line of the cup. The leaks had from time to time been patched with soft patches, using an iron clamp with red lead putty between, but lately they became so numerous and large that it was decided to renew the row of sheets on the channel iron that forms the grip. The holder is built in a

concrete masonry tank, and the water level is about 2 inches below the top of the lower lift when it is down, which necessitated the lowering of the water in order that the men could work.

A block-and-falls was then rigged up to each of the guide frame uprights, with a hook on the lower end reaching down and under the grip sheet, in order to hold the grip sheet and channel iron from falling after they had been cut loose from the lower lift.

The men were then set to work in pairs to cut the rivet heads, one using a hardy or side cutter, the other a light sledge hammer. After the rivet heads were cut off we found some difficulty in driving the rivets through without injuring the top sheets of the lower lift, but, after some experimenting, it was found best to pry the sheets away from the channel iron. For this work each man used two long, slim-taper cold chisels, driving one down between two rivets and leaving it there until the other had been driven down between the next two, then drawing the first one and driving it ahead of the second chisel; this loosened the sheets without the danger of tearing them.

When the lift-sheets were all loosened the channel and grip sheets were raised by means of the blocks and falls about 3 feet above the ground. The sheets were then marked as to their position on the channel iron, as it was found that the holes were not equally spaced, nor were they in line horizontally, so that each new sheet would have to be marked from the old sheet as a template. After this was done the rivets that held them to the channel iron were cut in the manner mentioned before.

In putting on the sheets red lead paint and red lead putty were used in the joint; $\frac{5}{8}$-inch and 1¼-inch machine bolts, with a grummet on the head, were used to bolt the new sheets to the channel iron, the bolts being put through from the under side of the channel iron, thus leaving the nut on the outside. The vertical seams were riveted, as was also the bottom stiffening rod. While the grip sheets were being bolted in place some of the men were set to tapping the holes in the outer side of the channel iron for 1¼-inch cap screws, and the holes in the top sheets of the lower lift were reamed so there would be a little clearance around the sides of the cap screws. This work being completed, the channel iron with the new grip sheet was lowered into place and cap screws put in about 1 foot apart all around the holder; then the spaces were filled in with cap screws, red lead putty being used in the joint.

It required 4,000 $\frac{5}{8}$ inch by 1¼ inches machine bolts, 4,000 ½ inch by ¾ inch cap screws and a strip of ¼ inch iron, 14 inches wide and 350 feet long, to do this repair job. The top lift of the holder was in operation continually.

While repairing this holder there was a peculiar accident which very nearly wrecked the top lift. Within a few feet of the holder is another of the same size and kind, and a cement lined overflow which keeps the water level the same in both holders. I mentioned above that the water level in the holder under repairs was lowered, and in order to stop the water from coming from the relief to the storage, the connection between the two holders was banked up with clay. When the channel iron and grip sheet were raised from the lower lift it was found that the water was about 2 inches higher on the inside of the lower lift than on the outside, showing that the lower lift was setting in mud sufficiently thick to keep the water from equalizing at once, in fact, it took nearly a week for the water to find its level.

One night, after the water had become level on both sides, the clay dam between the holders gave way and allowed the water from the relief holder to rush in. There being nothing to stiffen the bottom lift, and the mud below keeping the water from assuming the same level on both sides, the top sheets of the outer lift were buckled in against the top lift from the pressure of the water on the outside; when the top lift came down it caught on a horizontal seam and tore a hole 5 feet long by 2 feet 6 inches wide in the side of the top lift.

In making the second repairs, after the bent top sheets of the lower lift had been tied back, the work of repairing the upper lift was begun. A sheet of No. 12 iron, 3 feet by 6 feet, was secured, $\frac{5}{8}$ inch holes were punched 2 inches apart all around the edge. Bolts were made by cutting the heads from machine bolts and bending about 1 inch to 90, leaving 1¼ inches on the thread side, the threads being run down to the bend. The sheet was then placed against the holder over the hole with red lead putty between, and a hole drilled every 8 inches with a breast drill, and the bolts put in. The nuts were screwed tight, the bolt being held outside the nut with a pair of pliers.

The holder was then raised slowly and bolts put in 4 inches apart on the vertical seam until the bottom of the patch was reached, when there was some trouble to stop the gas; but, by quick work and the use of some putty, sufficient numbers of bolts were put in to make it tight, after which there was no trouble in putting in the balance of the bolts.

Practical Suggestions from a Practical Man.

[A paper read by Mr. Stephen A. Byrne, San Francisco, Cal., at the Fifteenth Meeting, Pacific Coast Gas Association.]

It should be the aim of gas companies to endeavor to run their plants 24 hours per day and sell gas in large quantities every minute of the 24 hours. To do this the companies have for years strived, and still the big day consumption of gas has not materialized. Advertisers, stove and appliance manufacturers, theoretical gas men, and many others, get money out of the gas business, and why should not a company which produces the gas also make money, and at the same time make the people, without expense to the company, advertise its business? To do this should be the aim of all managers.

I will now endeavor to offer a few suggestions which have occurred to me in the past 16 years, while connected with three gas companies, and also from observation of the methods of the others in their dealings with the public.

To begin with, everyone connected with the company, from the president down, should be imbued with the spirit of loyalty. They should be loyal to the company which employs them and loyal to each other. Managers should endeavor to gain the confidence of the men employed under them by fair treatment and living wages. They in turn, by their loyalty to the company, will gain the confidence of the consumers and make the management a success. To managers I would say, never permit yourself to think that you are the whole cause of the success of your company, but at all times remember that, without the co-operation of the men under you, your management will be a failure. I do not mean by this that you should become too familiar with them. You can have a pleasant word with them—it costs you nothing; you should know them, study their peculiarities and not be carried away with your own importance or everlastingly impress upon them the fact that you are the manager. Be friendly with them, but always firm, and keep them in their place; tolerate no undue familiarity. Once they get the idea that you are fair and intend to do what is right by them, their opinion is formed that you are a "good fellow," and their hearts are in the work. Their burden is lighter, and success marks your every effort; but let them get an idea that your head is swelled they will have no interest whatever in the success of the company. What they are then after is the day's pay with as little work as possible. Now, what is the result? Complaints—the hardest things any gas company has to contend with—which not only add to the cost of distribution, but injure the very business in which capitalists have invested their money and are paying you a good salary to build up. The good work that you do will slowly but surely manifest itself; but complaints and poor workmanship travel so fast it is impossible to catch up with them. For example (and every gas man will bear me out who has had any dealings with the public in the houses where gas is consumed), take it in a district where entire blocks are solidly built upon, "Mrs. Complainer" has a poor light, or her meter was over-read; the bill is high. She calls "Mrs. Will Complain" and informs her. "Mrs. Will Complain" suddenly finds that she has a grievance. They compare notes and decide to visit the company's office. Several others overhear the conversation, the result of which is a dozen complaints resulting from this one, and the company suffers by reason of the detrimental advertising it gets through the carelessness of an employee that it has paid to properly do its work.

San Francisco has now what is known as the "Gas Workers' Union," and I believe the Company is paying wages as per schedule submitted by the Union. On reading a copy of the schedule I was somewhat surprised to find that gas was now being supplied consumers by an army of "Specialists." It reminded me of a French dinner bill-of-fare. We now have pump men at so much per diem; meter men at so much per diem; service men at so much per diem; appliance men at so much per diem. In the new makeup I hardly recognized the business of other days. However, one thing on the schedule was overlooked. They neglected to mention the "old-fashioned fellow" who could do anything—run a service, set a meter, attend to a complaint, in fact, do anything when called upon. This, in my way of thinking, is all wrong. If it is necessary to pay the schedule price of $3.75 per day for a meter man, procure the best. Endeavor to obtain one who can do anything that he is called upon to do. This idea of sending out men who are not qualified to do anything necessary with either service or meter is a risky proposition. When it comes to disconnecting a service or meter an experienced and careful man should do the work. Explosions are costly, asphyxia-

tions are possible, and it is a certainty that a complaint will be on file in the near future.

Another proposition union gas companies have to deal with in San Francisco is the plumber and gasfitter, who claim certain rights which properly belong to the gas company—this is as to the services run between the walls and used for distributers. The Plumbers' Union claims the right to run all the pipe in a building, whether the same is used for a service or house pipe. The Company is permitted to run the service from the main into the basement and no further, and must connect on to the balance of the service pipe run by a member of the Plumbers' Union. Now, it stands to reason that a man who has never set a meter or in any manner had to deal with complaints is not qualified to install service pipes and distributers. In the first place, he does not know what size meter it will take nor the measurement of the various meters. The result is that the meter man is compelled to either tear out plaster or make the pipe as run answer. The result is that connections become trapped and meters are set in an unworkmanlike manner.

Now, I propose a remedy for this condition of affairs. Where there is but one company in the field that company can make its rules and compel builders to comply with them, or refuse to set a meter, on the ground that it is unsafe and dangerous to life and property, irrespective of any 10-day law that compels them to supply applicants for gas, as I will endeavor to explain.

Where there is an opposition company in the field, conditions entirely change, and in the "mad" fight for business they allow themselves to become a prey not only to consumers but builders as well. Heads of departments do not seem to realize that the more they give away to retain a consumer the more they have to give away. Whether it is in gas, employees' time or gas appliances, it is all money. The remedy where such conditions exist, is for the heads of both gas companies to get together and between them draw up a set of rules to be followed by architects and owners, compelling them to extend the house risers into the basement. Have a room or place set aside, properly ventilated, where a statement taker can read the meter, or, in case of a fire, the company has some chance to remove them and shut off the gas. San Francisco is at the present time being rapidly rebuilt; contractors are taking every advantage of the gas companies; risers no longer extend into the basement; meters are set on the various floors in the most out-of-the-way places. The result is statement takers lose time hunting them up. The door being locked he cannot see the meter, the result of which is a skipped or guessed-at statement. Another trip is necessary, bookkeeper behind in his work, and bills irregular, which is another source of complaint. I claim that it is not only dangerous and costly to install meters as they are now installed on the various floors in apoartment houses but entirely unnecessary, in so far as the gas companies are concerned. It is up to them to get together and force the builders and owners to find a suitable place in the basement for all meters, which would then do away with plumbers running gas service pipes, facilitate the taking of statements, and in many ways remove many of the chances the companies now take setting meters in bed rooms or other out-of-the-way places. Another thing against service pipes being run by plumbers is the fact that no provision is made for an opposition company, consequently but one pipe is run in the building to be connected up with service from the street, the result being that but one company, the one which gets its meter on first, has any chance; and, while there may be 20 families in the house, and 19 of them should want another company's gas, the other one could refuse to change, and force the 19 others to make use of the gas they do not want. Have the meters in one place.

If owners or tenants insist on meters being set on the various floors, let them be intermediate meters working off the house meter, and hold the landlord for the bill. Cut out making presents of Welsbach lights, etc., to hold consumers when opposition companies make their appearance. Guarantee them courteous treatment, a good quality of gas at a fair price, and no more. As it is at the present time, they expect companies to run pipe and "dance attendance" on them, or they threaten to change. It has become a common thing in the opposition district to see solicitors for the gas company follow up furniture wagons to get new business. Solicitors will next be required to lay carpets and move in furniture if the companies do not come to some understanding and prevent customers from working them. If it is the intention of one company to shut off a consumer for non-payment of bill, it should notify the other company so that the consumer cannot change until his bills are paid. If a consumer will not pay one company he certainly will not pay the other.

It should be the aim of gas companies to mainain a strict watch over the candle power and pressure, and at no time these to get below a certain standard. Direct communication by telephone between the uptown offices and the works should be had at all times, as upon this point depends much of their success. If the pressure gets too high, regulators refuse to work properly, quicksilver is blown out, causing leaks, and globes are broken. A blowing of gas at the burner has a tendency to turn light into heat, and a blue flame is the result. If the pressure is too low, gas stoves and appliances refuse to work, resulting in consumers becoming dissatisfied and blaming the quality; Welsbach lights have to be readjusted, causing much annoyance to consumers and getting them disgusted with a light that can do much to increase the sale of gas. Consumers' gas appliances are regulated to the pressure at the time said appliances are set up, consequently any change causes a readjustment of every appliance in use on your lines. It should be the aim of gas companies to promote the use of gas appliances and not make consumers disgusted with their use. This is one of the ways to secure a good day, as well as night, consumption of gas. Watch your pressure. About 5 inches of pressure throughout the city at all times would be sufficient and do much to prevent meters leaking in the stuffing boxes and dials. Gasholders located throughout the city, with independent lines leading to them from the works, would do much to steady the pressure. Holders could be filled during the day and consumers in the various districts supplied. By this means an even pressure could be maintained. Gas meters should be tested separately, not in batches. Where an average is struck, some may be fast, some slow, etc. It is as bad for a gas company to send out a slow meter as it is to send out a fast one. You cannot keep a woman's tongue still even with a slow meter. If it happens that she has a slow meter and her bill is small, she seems to take delight in telling her next door neighbor and everyone else; the result is that you have those same neighbors visiting your office, making a "high bill" complaint, and at the same time telling you all the gas Mrs. "Slow Meter" used compared with what she used, and what she paid and what *they* pay. Be sure of every meter you send out, and the only way to do it is to test it separately, and carefully inspect it for leaks. Use gas for testing, so that any bad action may be detected and future complaints and change of meters avoided. Measuring gas is the condition under which the meter is going to work, consequently it should be tested with gas. Deposits on meters are absolutely necessary with some people, and where there is more than one company in the city some understanding should be arrived at for their own protection. With a property owner or a person known to the company no deposit should be required; but people who move in and out should be required to furnish a responsible guarantor or made to pay a deposit. Collectors should be prompt in collecting regular bills and give special attention to closing bills. If your collector notifies a consumer to pay by a certain day or be shut off, see that the notice is carried out. He, being on the route, is the best judge of who is good pay and who is not. If notices are lived up to consumers know that they mean what they say, and always pay attention to them. If you are careless they get careless; the result is that their meter is shut off when least expected. If your notice is a bluff one month, have they not reason to think they are every time one is left?

Gas companies should keep an accurate record of all meter measurements as to size, length of connections, etc., and have a special book made for same. This is a very easy matter for any company to handle. As a new meter is set or an old meter removed have the meter man turn in the measurements. These can be entered up, and in the event of an order again being received a meter man will know exactly what size meter and connections are necessary, and possibly save thousands of dollars in time and stock. If a meter man is sent out each time to get a measurement much time is wasted. If, on the other hand, he must take a guess measurement, what is the result? He does not intend to get stuck; therefore, he takes out the longest lead connections he can get hold of, fills his pockets with an assortment of fittings, nipples, etc., and proceeds with the job, determined to set the meter any old way so long as it passes gas. Possibly he has taken 1 foot more lead, at so much per pound, than was necessary, and the Lord knows how many unnecessary fittings are thrown away. Again, what is the result? Complaints. As before mentioned, the guess measurements had to go; the unnecessary lead was twisted and trapped so badly that complaints continue to come in from the consumer until the meter is finally removed. The same is true where wagons are used in so far as trapped connections are concerned. As they also carry a limited assortment of lead connections they must

also make whatever connections they may have with them do. Fifty per cent of the complaints come from trapped meter connections. The same means should be taken to keep an accurate record of service measurements. A large percentage of the complaints of trapped services comes from the service being run in an unworkmanlike manner. It becomes a very costly service if it must be pumped out every month. Also, take into account the annoyance the consumer has to put up with, trying to use gas through a trapped service. To avoid complaints, and in a manner bring about a good feeling between consumer and gas company and also reduce the cost of distribution, the company should take hold of the complaint as a surgeon would a sick man. When you find a complaint arises from a trapped service or meter connection, cut it out.

A gas company cannot please everybody, but it can make an effort to please, and do so with honesty to itself and the consumer. It is, therefore, advisable to have a practical gas man attend to the complaint counter. An intelligent talker can do much to convince and please a consumer. If you think a consumer is acting honestly in making a complaint, and you believe something is wrong, change your meter and test it. Remember, a meter is a piece of mechanism liable at any time to get out of order. It is just as apt to be slow as fast. Never refuse to retake a statement to please a consumer; a mistake in overreading is liable to happen and is easily adjusted.

To conclude, will say that gas from the holder to the burner should be given every possible attention, and no expense spared in thoroughly purifying it, as many of the complaints charged up to the meter and service department can be traced to the works. Among some people there seems to exist a natural prejudice to gas companies; they are unreasonable and will not be convinced. Such people are in many respects the cause of clerks on the complaint counter going so long unmarried. The scowl or their faces will not come off. This, combined with the fact that they are human beings and can only stand a certain amount of abuse from prejudiced customers, should cause managers to limit the time a clerk should attend the counter, so that the company and the consumer, in their efforts to understand one another, can do so. And this can only be done by the company having its representative cool, as the consumer is certainly coming in hot.

Something New About Determining Heat Units.

[A paper read by MR. FREDERICK C. JONES, Oakland, Cal., at the Fifteenth Meeting, Pacific Coast Gas Association.]

The usual method of calculating the specific gravity of a gas from its analysis is to multiply each constituent percentage by its own specific gravity, compared with air, add the products thus obtained and divide the sum by 100.

Now, the specific gravities compared with air of the different gases making up illuminating gas are numbers running into decimals of four and five places, while the specific gravities compared with hydrogen are simple whole numbers, as follows:

CO_2	22
C_2H_4, CO, N_2	14
O_2	16
H	1
CH_4	8

It is simple then to multiply the per cent. of CO_2 by 22; add the C_2H_4, CO and N_2 together and multiply by 14, and so on, then divide the sum of these products by 14.43, which is the specific gravity of air compared with hydrogen. This result divided by 100 gives the specific gravity of the gas, when air equals 1,000.

A Recent High Pressure Installation.

[A paper read by MR. E. C. JONES, Mem. Am. Soc. M.E., at the Fifteenth Meeting, Pacific Coast Gas Association.]

The rapid growth of the suburbs of San Francisco, towards the south, presents an alluring field for high pressure gas distribution. San Francisco is situated at the end of a peninsula, bounded on the north by the bay of San Francisco and the Pacific Ocean, on the east by the bay of San Francisco, on the west by the Pacific Ocean, and on the south by a chain of beautiful suburban towns, extending as far as San Jose, 50 miles away.

These towns are protected from the winds and fogs, which tend to make San Francisco an unpleasant dwelling place, and the climatic conditions are such that, as we go south from the city, we enter a veritable garden spot with semi-tropical vegetation, and every attraction to the suburban resident, including excellent railroad facilities, both steam and electric.

In the early days of gas lighting on the Coast there was a small coal gas works at San Mateo, 21 miles from San Francisco, and later on an oil gas plant was built at Redwood City. After the usefulness of high pressure systems had been demonstrated, a high pressure line consisting of 2½-inch extra heavy pipe, with line pipe sockets, was laid from Redwood City to San Mateo, 8 2 miles. On this pipe a pressure of from 10 to 30 pounds is maintained, depending upon the demand for gas. This line feeds into a high pressure district in San Mateo, which includes 63,490 feet of 1 and 2-inch pipe. The consumers in this town are served with gas through high pressure regulators at the inlet of each meter. This permitted the shutting down and dismantling of the San Mateo gas works.

A high pressure system was also installed at Redwood City, consisting of 5,410 feet of steel pipe in small sizes. This is used in conjunction with a low pressure system at Redwood City fed from the gas works by one governor, reducing the pressure to 4 inches of water. The work of compressing the oil gas at Redwood City was performed by a steam-driven compressor, with suitable governors for regulating the high pressure of San Mateo and the high and low pressure mains of Redwood City.

During the early part of 1905, Palo Alto, a city of 4,500 inhabitants, located 5 miles south of Redwood City, was piped for gas with small, high pressure mains, and using individual governors. This work was done by the Palo Alto Gas Company. This new Company purchased its supply of gas from the Redwood City plant. To supply this district, a 3-inch outside diameter steel tubing, 26,365 feet in length, was laid in the country road, and 4 storage tanks, 29 feet 6 inches in length by 4 feet 6 inches in diameter, were installed at the Palo Alto end of the line. This installation was completed May 11th, 1905.

In casting about for a suitable place to locate the storage tanks at Palo Alto, it occurred to the writer that it was not necessary to purchase or rent real estate for the purpose of placing gas storage tanks above ground, as many gas companies all over the world are occupying the streets with gas mains of greater diameter than these storage tanks. The tanks were, therefore, placed under ground in a tandem sequence closely surrounded by earth, while the regulators occupy spaces between the tanks in neat boxes with covers flush with the surface of the ground. This arrangement is both safe, inoffensive and economical. This high pressure line is operated under pressure varying from 40 to 60 pounds, and to insure continuous service, it became necessary to install an electrically operated compressor at the Redwood City plant, retaining a gas engine driven compressor as a reserve.

To improve the service, and to permit of better regulation, a storage tank was installed at the Redwood City works, and into this tank all the gas used by Redwood City, San Mateo and Palo Alto was pumped. The gas was liberated through separate governors giving to each of the three places the required pressure. At that time the effect of compression on candle power was being widely discussed and was but little understood. All that was known was that the illuminating value of the gas suffered almost directly proportionally to the increase in pressure.

It was evident that the raising of the pressure to 60 pounds on the Palo Alto line reduced the candle power 4.6 candles. The compression liquid, depending in quantity on thermal conditions and the amount of pressure, was being drawn out of the drips on the line. This liquid consisted of water, naphthaline, and a high grade of benzol. This benzol represented the cream of the candle power of the gas, and consisted of the least staple and most sensitive hydrocarbons which were squeezed out of the gas by compression.

The writer inferred that the compressed gas at 60 pounds pressure was nearly free from water, and was, therefore, in the best condition to readily and quickly take back into itself the hydrocarbons which had been squeezed out of it; also, that the hydrocarbons would more readily be taken up and again enter into the composition of the gas than the water would be, because the benzol evaporates so much more readily than does water.

The physical changes in the gas due to compression, and to the restoration of the candle power, are in the following sequence: The compressor squeezes out the water and some of the hydrocarbons, and, in order to replace the hydrocarbons, it becomes necessary to keep the gas in intimate contact with the fluid resulting from compression. To do this the writer designed an extremely simple piece of apparatus,

and gave it the name of auto-enricher. It is a simple cylinder, preferably of large size, into which all of the compressed gas and the fluid of compression as they come from the compressor enter at one end at the top, and the gas is taken out at the other end at the top, care being taken that the passage of the gas is slow, and that none of the liquid is allowed to escape from the auto-enricher except as it is taken up by the gas. Such a re-enriching tank was placed under ground at the Redwood City plant, with the result that the candle power at San Mateo, Redwood City and Palo Alto was restored to its original condition before compression.

Further experiments (which were subsequently made the subject of a paper by the writer, read before the American Gas Institute) proved that, by raising the compression, certain physical changes took place in the gas, until at 300 pounds pressure the gas was completely purified from sulphuretted hydrogen and naphthaline, these going down with the compression fluid and not reappearing in the gas when the benzol is taken up by the gas in the re-enriching tank.

In 1905 the largest oil gas plant in the world was designed and constructed, on new lines, at a point on the bay of San Francisco in San Mateo county, in close proximity to the San Francisco border line, and was named for our President, Martin Station. This plant was built for the purpose of supplying gas to a number of large gas engines for directly generating electricity. Before the completion of these engines the gas generating plant was finished and started.

To utilize this enormous plant a 12-inch steel tubing was run along the county roads into San Francisco, and connected with the works of the San Francisco Gas and Electric Company, at the Potrero Station. The length of this line is 4½ miles, and a steam driven compressor was used for transferring the gas. This proved so satisfactory that it became the nucleus of the largest compression plant for manufactured gas in existence. Two power driven compressors were installed, each having a capacity of 5,500,000 cubic feet of gas in 24 hours. Following the growth of this plant, the gas engines, 3 in number, each of 5,333-horse power, were completed and successfully started. Between Martin Station and the south is the high ridge of the San Bruno mountains, but west from Martin Station there is a gap through the range, which permits of a practically level outlet into the county roads leading from San Francisco down the peninsula to the south. It required the earthquake, which is not yet effaced from our memory, to bring out the fact that Martin Station is a desirable point from which to supply gas to the cities and towns of the peninsula through high pressure mains.

The peninsula towns were directly in the path of the earthquake's greatest destruction, but as the high pressure mains and nearly all the distributing mains in this section were of wrought iron, not the slightest damage was done to the distributing system—this is true of all the high pressure systems in California. No wrought iron pipe was broken and no joints were disturbed.

The Redwood City gas works, however, did not fare so well. The boiler settings were badly damaged, and the gas generating apparatus was moved several inches on its foundation, while all cast iron connections were more or less damaged. A 20,000 cubic feet gasholder, in a redwood tank, was completely demolished. This adjustment of matters by the earthquake made it much easier to decide to supply this district from Martin Station.

On February 23d, 1907, the work of laying a 4-inch steel tubing from Martin Station to Redwood City, a distance of 125,295 feet, or 23.73 miles, was begun. The inside diameter of this tubing is 3.7 inches. This pipe passes through the following suburban towns, all of which receive gas from it: Burlingame, population 900; San Mateo, 4,600; Belmont, 500; Redwood City, 2,500; Fair Oaks, 250, and the Palo Alto extension, including Menlo Park, with a population of 1,200, and Palo Alto, 4,500, making a total population of 14,450.

This high pressure line was laid with Dresser couplings, using rubber gaskets, the flanges of the joints being drawn up tightly and evenly to prevent the contact of the gas with the rubber as much as possible. It is quite important, in using this patent coupling, that the tightening of the bolts shall proceed evenly, so that the flanges may remain parallel. Should one side of the flange be drawn up more than another, the pressure on the rubber gasket is uneven, and the flange is apt to bind on the pipe so that a leak is almost certain.

The painting of this line was a matter of some study, as it had previously been found that red lead and linseed oil of the best quality, although offering a good protection to the pipe, would not withstand the attacks of either the air or the soil. This pipe was, therefore, first thoroughly cleaned and painted with one coat of red lead and oil, then given a second coat of a good and well-proven metallic gasholder paint which dries with a hard, shiny finish. It is hoped that this covering will be more durable than those formerly used.

A new pattern of drip box was used on this line, and 25 of them were located at various low points throughout the length of the pipe. High pressure valves made for the purpose of holding ammonia were placed in the line at 5 different points, at the approach of each town. These valves were connected into the line by means of an adapter to permit the connecting of a Dresser coupling with a flanged valve. The drip box is provided with half a Dresser coupling on each side to facilitate its being connected into the line. Sketches of the drip box, valves and adapter are shown in illustrations A, B and C.

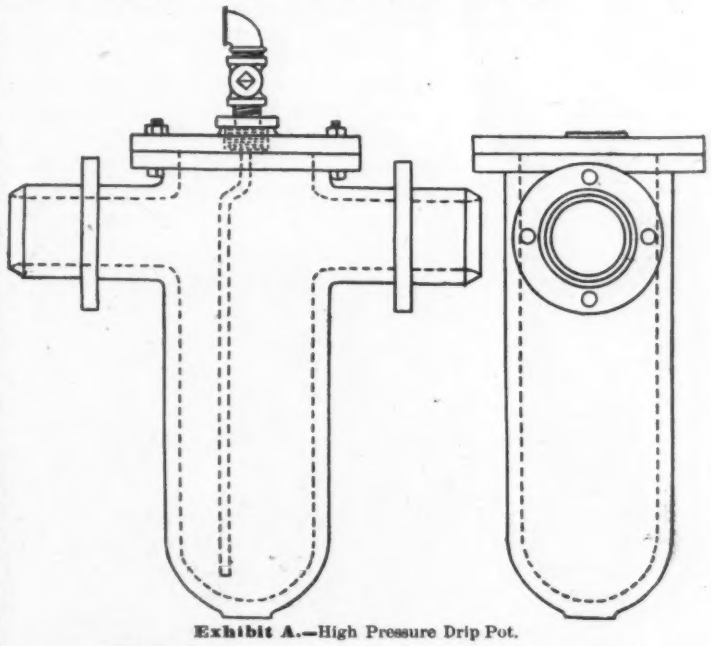


Exhibit A.—High Pressure Drip Pot.

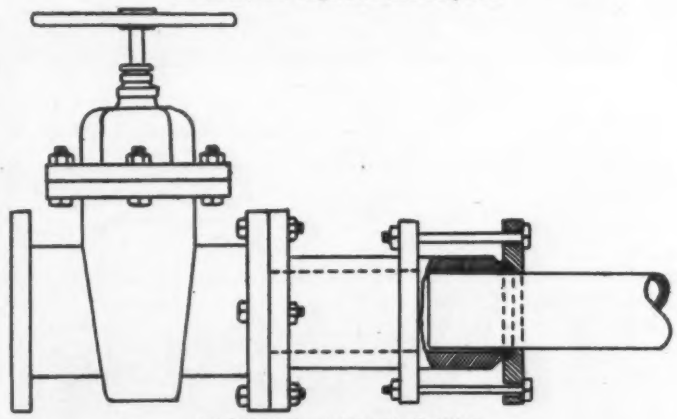


Exhibit B.—Adapter in Position.

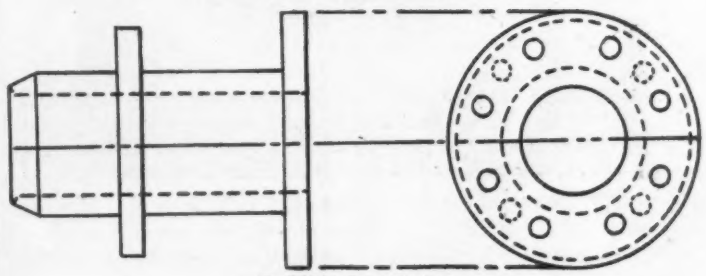


Exhibit C.—Adapter.

No other fittings are used in this line with the exception of 6 crosses, one at each town. These crosses are provided with adapters to Dresser couplings, and all right angles are turned by bending the pipe at a uniform radius of 20 feet.

At the completion of each day's work the line was capped and air pressure applied to it, up to 100 pounds to the square inch. This pressure was allowed to remain on the line the entire night. Testing for small leaks was done by the use of soap suds and a brush, the soap suds being applied to all parts of the coupling and to the pipe for a distance of 2 feet each side of the coupling, as this seems to be the vulnerable place where the pipe is apt to be split.

One of the details developed in connection with testing for leaks is

the fact that thick soap suds which has been mixed for several days is better than soap suds quickly and imperfectly mixed. The importance of careful testing is evident when it is stated that 182 defective sleeves and 29 lengths of split pipe were discarded on this line.

Much of the work was done during uncertain spring weather, and a plow could not always be used to advantage, so that it was necessary to do much of the work with pick and shovel. A grader was used for refilling, and all of the trench after being filled was carefully sprinkled and rolled.

The line was completed June 1st, 1907. The actual working days required were 75. The average amount of pipe laid each day was 1,660 feet, while the greatest amount laid in a single day was 3,200 feet. The average depth of the pipe is 2½ feet. The line was placed in commission Thursday, July 18th, 1907, and not a single leak developed in any part of the line.

The gas is pumped into the line by a 14 inches by 16 inches by 12 inches steam driven compressor, with a mechanical efficiency of 85 per cent., and requiring 55-horse power to drive it, under the present conditions. This compressor has a capacity of about 22,500 feet per hour. The gas is first forced through an auto enricher, shown on the right in Exhibit D.

Exhibit D.

Exhibit E is another view of these tanks, showing the manner of

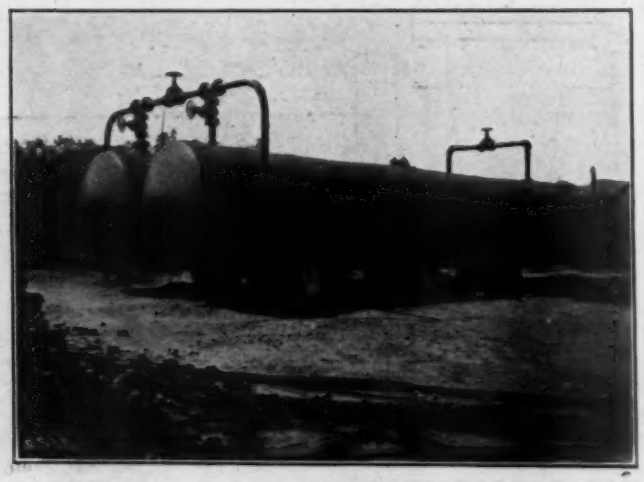


Exhibit E.

connecting them. The inlet is to the right, and the outlet to the left; the by-pass valve on the top being closed.

The left-hand tank is used for the purpose of storage. These tanks are 6 feet in diameter by 32 feet long, and have a capacity of 875 cubic feet. The line itself has a capacity of 9,375 cubic feet. The 25 drips on the line have a combined capacity of 19 cubic feet, and the receiving tank at Redwood City 380 cubic feet. The total capacity of the tanks and line is 11,524 feet. The gas is received at Redwood City into a storage tank 5 feet in diameter by 26 feet long, shown in Exhibit F.

This tank is used for receiving all the gas, and from it the various lines are fed through governors.

Exhibit G shows 4 compression tanks with an arrangement of governors.

Exhibit F.

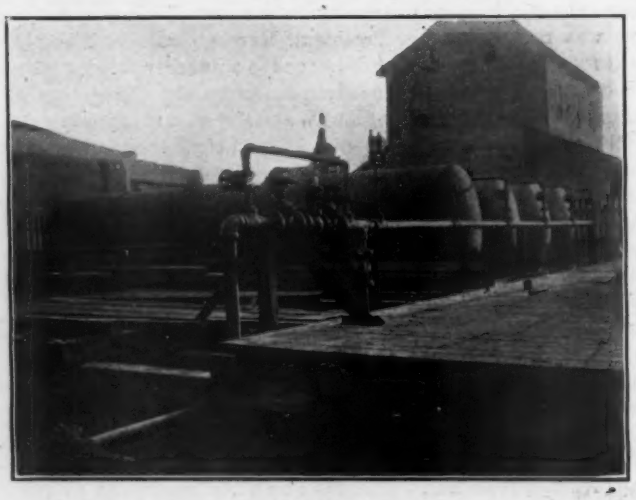


Exhibit G.

These tanks are 6 feet in diameter by 32 feet long and are located at Redwood City, as a reserve storage to be used in the event of an accident to the compressing machinery, or on the pipe line. The gas is taken from the receiving tank, Exhibit F, and pumped by means of a motor driven compressor into the 4 storage tanks at a pressure of 80 pounds to the square inch. This boosting arrangement is a temporary expedient for present convenience, and is capable of many changes, as the storage tanks may be filled directly from the line and discharged automatically through the present governors whenever there is a drop in the pressure. At the present time, approximately 100,000 cubic feet of gas per 24 hours is consumed through the Redwood City high pressure line, and the line is so free from defects, and the storage capacity of the line and the 3 tanks (disregarding the 4 storage tanks at Redwood City) is so large, that the compressor at Martin Station is only operated a portion of the time.

For instance, on August 30th, which was an average day, the compressor was operated from 8 A.M., when the pressure was 53 pounds, until 10:30 P.M., at a pressure of 66 pounds. It was then shut down until 6:30 A.M., when the pressure was 50 pounds, and was operated until 8 A.M., at a pressure of 55 pounds. On this day the compressor was operated a total of 16 hours, and the greatest variation in pressure was 16 pounds. The drop in pressure was gradual from 10:30 P.M. from 66 pounds, until 6 A.M., when the pressure reached 55 pounds. From 6 A.M. to 6:30 A.M. the pressure dropped 5 pounds, showing that the consumption of gas for the "breakfast-peak" reduced the pressure 5 pounds in 30 minutes.

The pressure at Redwood City coincides with the pressure at Martin Station. For instance, at noon, August 11th, the pressure at both places was 50 pounds. At 1 P.M. the compressor was started with 45 pounds pressure at each point, and operated until 4 P.M., when the pressure was 55 pounds. The compressor was then shut down until 6 P.M., and the pressure was 50 pounds. At 10:30 P.M. the compressor was shut down with 65 pounds. The compressor was then shut down till 7:10 A.M., when the pressure at each point was 55 pounds. All of these pressures were the same at both ends of the line.

This coincidence of pressure may be accounted for by the comparatively large capacity of the line and small consumption of gas. This

is an argument in favor of large, high pressure transmission lines, and the greatest care in their installation to insure tightness.

This 4-inch O.D. line has an actual capacity of 5 atmospheres or 58.8 pounds pressure of 57,620 cubic feet, or an available capacity at that pressure of 46,096 feet. In speaking of atmospheres in reference to pressure, it must be remembered that when we say that we have 5 atmospheres in a tank, we do not mean 5 available volumes of the tank, but 4 available volumes, and 58.8 pounds pressure, there always being 1 volume or atmosphere that is not available or apparent on the gauge, and which cannot be gotten out except by exhausting the tank to a vacuum, or filling it with water.

This line completely installed cost 1½ times as much as a 2-inch outside diameter line which would have an actual inside diameter of 1.782 inches. It has an actual holding capacity of 4.3 times as much as a 2-inch O.D. line, and its carrying capacity at equal pressures is 5.75 times that of the 2-inch O.D. line.

This installation is amply large to provide for the growth of the southern suburbs of San Francisco for many years, and will insure excellent service to the best class of gas consumers. The average monthly consumption per meter of these consumers being 4,570 feet, which is in excess of that of most of our large cities.

In conclusion, the writer may be permitted to apply a very old saying to high pressure gas distribution that, like fire, it is a good servant, but a bad master.

Gas in New York.[1]

We are indebted to the courtesy of Mr. Robert E. Livingston, Editor of *Gas Logic*, for the advance proofs of the following interesting article on "Gas in New York," originally prepared for the publication named:

The history of light in New York is, as the history of common things is apt to be, closely interwoven with the life of the city. The social, business and even the political progress of our ancestors, was in pretty close touch with the kind of light they had.

The very first light in New Amsterdam was probably a candle. The Indians were content with firelight and pine torches, but it is hardly conceivable that the first settler to step on shore at the Battery should not have had a few candles tucked away in his baggage. Every thrifty housewife saved fat carefully and made candles regularly once or twice a year. At first they were made by the simple process of hanging the twisted wicks, in a row, from rods, and dipping them, half a dozen at a time, into great kettles of tallow, then repeating the process after the first coat hardened, and so on till the candle of regulation size was formed. It was a tedious and difficult job, for sometimes the tapers would not harden or would come out in crooked shape, and the latter imperfection meant sputtering and dripping lights. Later, candle molds were introduced, and there is hardly an old farmhouse garret which has not a set of these among its treasures.

Bayberry wax was much used for candles, and being fragrant and of a delicate green color, was considered quite as good as the Old World wax candle which soon began to be imported for state occasions. The bayberry candle is still made in Deerfield, Mass., and sold to visitors.

But the poorer people, who had not money or time for candles, burned pine knots, or sometimes what was known as a "betty"—a malodorous contrivance consisting of a twisted rag in a saucer of grease.

During the 18th century the development of the whaling trade made sperm oil a common article of commerce, and lamps came into vogue. A whale oil lamp is dirty and does not smell sweet, but it saved the trouble of making candles at all events, and New York, always eager for the latest thing in fashion, burned lamps for a generation or two.

In those days a handsome lamp was part of every self-respecting housewife's bridal outfit. Little girls were taught to knit on lamp wicks, the simple knitting stitch being used to make the strip of cotton or woolen stuff used as a wick. Another way of making lamp wicks is still seen, though the product is no longer used for that purpose, or for any purpose in particular. It is the "knitting on a spool" which children do with 4 pins to this day with colored wools.

An interesting old book for the information of persons intending to migrate to the United States, published in London in 1810, gives the price of candles as 8d., or 16 cents, and of "mould candles" at 11d. (22 cents). The author adds: "Candles are not so good as they are with us; soap is superior." At that time there were some 17,000 houses in New York, generally built of brick with slated or shingled roofs. The author suggests that a merchant might combine the oil and color business profitably with that of a tallow chandler, adding that "the latter is prohibited from carrying on the operation of melting contiguous to the thickly inhabited parts of the city." The rent of a house to suit an oil business would be $125 to $150 per annum; and a capital of from $800 to $1,000 would be sufficient. The wholesale price of foreign tallow at that time was about sixpence a pound.

There is something uncanny about the invisible, although we are getting used to it in these days of horseless carriages and wireless telegraphy and automatic contrivances of every kind. But fancy what it must have meant, away back in 1823, to light your house with an illuminant that could not be seen! Those were the days when men walked on their own feet or rode on horseback or in queer old carriages, and fires were in plain sight in the fireplace, and everybody in town knew when the stage coach came in. There was a certain kind of bravery in the determination of Mr. Samuel Leggett, first President of the New York Gas Company, to light his own house with gas.

Mr. Leggett lived at No. 7 Cherry street, only a stone's throw from the house No. 1 Cherry street, in which George Washington lived in the first days of his Presidency. It was a handsome house for those days, and might challenge admiration even now, with its solid timbers and mellow red brick and substantial air of prosperity. The gas pipes introduced into this residence were primitive. They were gun barrels. At that time the water mains of the old Manhattan Company were made of trunks of trees, and the gas mains which conducted the gas from the corner of Hester and Rynders (now Center street) were nearly as unscientific in construction.

But the gas burned brilliantly, and after Mr. Leggett's neighbors got over trembling in their shoes for fear it would blow up some night and set the street on fire, they began to regard his house as one of the show places of the neighborhood. In those days Battery Park was the fashionable promenade—it was before the great fire of the thirties, which swept away half the fine houses at the lower end of Broadway—and the belles and beaux used to come strolling up Cherry street past Mr. Leggett's house to see if the lights were really such a galaxy of brilliancy as had been reported.

New York never has been slow to take up a new idea, and it was not long before all the best people in town were using gas, and it became necessary to build a larger gas plant at the northwest corner of Center and Canal streets, where Earle's Hotel afterward stood. But it was indeed a baby affair compared with the gasholders now being constructed by the Astoria Light, Heat and Power Company, at Astoria, L. I. These holders will each contain 15,000,000 cubic feet of gas.

When Mr. Leggett introduced gas into his home, not much more gas was used in all New York in a year than the Consolidated Gas Company now distributes between 6 and 7 o'clock on any December afternoon. For a quarter of a century this little gas plant sufficed. Then, in 1848, the new works were built at 21st street and Avenue A. A gas plant still exists there.

An old New Yorker, who was connected with the Gas Company in the 60's, at the time of the draft riots, says that one of the uptown gas plants had in its employ a negro messenger or man-of-all-work, and that they were obliged to hide the unfortunate man in the cellar to prevent the mob from hanging him to a lamp post, so great was the fury against the race considered to be the cause of the war.

Mr. Leggett's product was made from resin, which gave an excellent quality of gas for that period, and was considered quite satisfactory. In 1848 the New York Gas Company was selling about 35,000,000 cubic feet of gas. On the day before Christmas, 1904, the Consolidated Gas Company distributed 2½ times as much as that. One of the new gasholders of the Astoria Light, Heat and Power Company, at Astoria, L. I., will contain more gas than was used in all New York in 1832, and it would have taken 6 of these immense gasholders to supply the demands for gas for the boroughs of Manhattan and the Bronx for the 24 hours of December 24, 1904.

It would be interesting to speculate on the amount of illuminant of various kinds which would have to be used in New York if we had only as much gas in proportion to the population as was in use in 1823. Of course, in those days New York was a village compared to the present metropolis. Even 80 years later there were 3 country crossroads where the Flatiron Building now stands, and for hundreds of acres in all directions there was nothing but open country. Yet even

1. *Gas Logic*, for October.

so, the number of people using gas in New York was small compared with the proportion who use it to-day. Fancy the situation of 2 millions of people obliged to burn candles and oil for lighting purposes and do all their cooking with coal or wood! Imagine the labor required to tend lamps, snuff candles and build fires! And imagine having to store all this fuel on Manhattan Island or near by! It is unthinkable.

Rules for the Burner Maintenance Staff of the Gas Light and Coke Company.

The rules given below are those put forth for the guidance of workmen employed in the Chief Inspector's Department of the Gas Light and Coke Company, London, England, in the division concerned in caring for and the maintenance of incandescent gas burners:

Uniform.—Upon entering the Company's service each maintenance fitter is provided with a uniform cap, and, at a later period, with a complete uniform, consisting of tunic, vest, pair of trousers and overcoat, and the Company holds him responsible for the safe custody of each of the above. The uniform must be produced complete at any time when called for, and must be returned to the Company whenever the fitter leaves the service.

Box and Tools.—Each fitter is supplied with a maintenance box containing sundry tools and materials, and he is held personally responsible for the safe custody of these, and required to pay for the replacement of any article missing at any time an examination is made. The box and contents must in every case be left with the storekeeper each night.

Stock.—Each fitter will be held responsible for all goods issued to him daily, and should any be missing at any time he will be liable to pay for the replacement of same, or to dismissal, if he cannot give a reasonable explanation of the shortage.

Loops, Ash and Boxes to be Returned to Stores.—The fitters are required to collect and bring into the stores the asbestos loops of all mantles replaced, together with the ash of the old mantles, and to bring back all the empty cardboard mantle boxes.

Pocket Book.—A pocket book is supplied to each fitter, in which he is to make all notes necessary during his work, including any request of consumers or their servants, and to report the same in writing immediately on his return to the office, in the book kept for that purpose.

Orders from Consumers.—An order book is issued to every fitter and he must respectfully ask the consumer to sign an order for anything required outside the usual maintenance work, unless the maintenance card contains instructions to supply free of charge. If his order book is lost at any time, the fitter is liable to be suspended from duty until the same is found.

Fitters Not to Accept Payment or Do Work on Their Own Account. Any fitter accepting payment from any consumer for any goods or for any work done, or undertaking maintenance work on his own account, will render himself liable to prosecution as well as to summary dismissal.

Usage of Mantles.—The usage of mantles must be kept as low as possible, compatible with the maintenance of efficient lighting. All causes of heavy usage must be promptly reported.

Daily Report Sheets.—The time of arrival at consumer's premises and of leaving, and all material used on each job, must be correctly entered on the report sheet on the completion of the job.

Correct Particulars on Card.—Fitters must see that the name, address and all particulars on the inspection card are correct, and report any alteration required on return to the office. On no account may the fitter make any alteration on the card.

Contracts.—On being given contracts to verify, the fitter must carefully count the burners and ascertain that the number and type agree with the particulars shown on the contract, and that the contract covers all the incandescent burners on the premises. On no account must he make any alteration, but must report any discrepancies at the office.

Escapes.—Escapes must be reported immediately on return to the office. Fitters must, if possible, temporarily secure the same with white lead while on the premises. If the escape is serious, the fitter must at once telephone or telegraph to the office, giving all particulars.

Complaints of Bad Supply of Gas.—Complaints of bad supply must be carefully noted and be reported on return to the office, but the fitter must first be careful to make quite sure that the complaint is not due to defective or dirty burners.

Fixing Globes.—Fitters must use special care in fixing globes of lamps or of inverted burners, to see that they are left secure but not screwed up too tightly. Sufficient room must always be left for expansion by heat—say about $\frac{1}{16}$ of an inch at least.

Breaking of Globes.—Any globe broken by a fitter during his day's work must be noted in his pocket book and replaced the same evening. In all cases where a globe is found cracked, the fitter must draw the consumer's attention to the fact, and ask for an order to replace, before attempting to touch the same—unless he has instructions on card to replace free.

Use of Trestles, Etc.—On no account must trestles or steps be left unprotected in the public footway. A fitter using them should ask one of the consumer's employees to keep watch, should he at any time have cause to leave the trestles or steps.

Bonus.—Fitters are paid a quarterly bonus of 8 cents for every burner maintained on the average per day by the fitter in excess of an average of 150 burners per day, provided the work is carefully and properly carried out, and that the attendance and general conduct of the fitter are in every way satisfactory.

Regulations in Germany Respecting the Placing of Gas Stoves.

The German Gas Association, in collaboration with Prof. Rietschel, has agreed upon these rules in connection with the placing of gas heaters:

1. Large stoves connected with chimneys should be constructed and put up in such a manner that, independently of the arrangements for carrying off the products of combustion, and in case of the momentary failure of these, there may never be any incomplete combustion of the gas nor extinction of the flame.

2. Small apparatus without chimneys should also be so constructed that the combustion of the gas is always complete.

3. Large heaters for rooms, bath heaters and gas cooking ranges, and other large pieces of apparatus, should always be connected with a chimney.

4. Besides chimneys belonging to the gas apparatus, small rooms containing gas heating apparatus, such as bathrooms fitted with gas bath heaters, should have suitable ventilating apertures.

5. Gas heating appliances should always be put up by people of skill, and be always maintained in good condition.

6. Stopcocks should never be opened, or left open, without at once lighting the gas; it is a good rule always to light the match before turning on the gas.

7. The owner or user should apply himself to a study of the working of the gas heating appliances he uses so far as to enable him to perceive whether or not they are working well, as indicated by the absence of disagreeable smell and by the form and color of the flame.

8. Upon bath heaters, or near them, a card should be put up giving instructions for the use of the bath heater and stating the precautions to employ.

The Oxy-Gas Light and the Manufacture of Oxygen.[1]

A paper describing the modern method for the manufacture of oxygen from the atmosphere and the use of the gas as an aid to the production of efficient lighting units from coal gas, read at the last meeting of the Austro-Hungarian Association of Gas and Water Engineers, was printed in a recent issue of "Gastechniker," the author being Herr Hansmann.

Herr Hansmann began his communication by sketching the earlier chemical methods for preparing oxygen in quantity, pointing out that they were not commercially successful, and that therefore illuminants like Drummond's lime light (which was invented in the year 1825) had never really become successful except for certain small and specialized purposes. When, however, the later experiments on the liquefaction of air showed that oxygen could be recovered in a state of purity by fractional distillation of the liquid, it became technically and economically possible to use oxygen in conjunction with coal gas for the general purposes of lighting.

At the present time oxygen is made in the following way: Air is freed from moisture and carbon dioxide and raised to a pressure of (say) 200 atmospheres. It is then caused to enter one of three coiled tubes of narrow bore which are surrounded by a common jacket. The tube in question soon increases in diameter, and communicates with a reducing valve which leads the air into collecting vessels, whence it passes backwards through the jacket already mentioned. The ex-

1. *Journal of Gas Lighting.*

pansion of the air causes a reduction in its temperature, which is transmitted to the further quantities which are travelling through the coil. On repeating this process several times, the temperature of the air is continuously reduced until it finally reaches a point where liquefaction occurs. The liquid air next passes to a fractionating column, trickling down through a number of sieves or a thick layer of glass beads. In these circumstances, much of the nitrogen and a small quantity of the oxygen volatilize; the gaseous product being caused to encounter the liquid air on its entry into the column so as to evaporate more of the nitrogen and condense more of the oxygen. Hence the liquid which collects in the final receiver of the apparatus is fairly pure liquid oxygen. The liquid is allowed to evaporate once more, and is caused to pass through the inner tube of the coils, thus, like the cooled gaseous nitrogen, serving to remove part of the heat from the original compressed air. The apparatus in general is so constructed as to prevent access of heat to the utmost extent possible; but in spite of the most perfect insulation, so much heat enters it by conduction and radiation that fresh work has to be done upon the air in the form of compression throughout the whole process.

The Oxy-Gas Light.—The first burner in which oxygen was successfully used in conjunction with a gas flame with the object of evolving light was invented by Herr Nürnberg, of Berlin, in 1904. The essential feature of the apparatus was that the jacketing tube was provided with an elbow, so that the oxygen met with some resistance during its passage to the flame, was diverted from its original direction, and impinged upon the stream of gas at a sharp angle. This arrangement not only led to more perfect mixing of the gas, but also kept the flame away from that part of the burner which would otherwise suffer most from heat. The original burner has since been modified in a great many ways; but the crooked oxygen tube is still found indispensable. Nürnberg originally designed a common cock for the control of the two gases, having a plug with two holes and one single casing. The appliance had the defect of not being part of the burner, so that certain joints had to be made by brazing. Latterly, a more practical apparatus has been designed, which is arranged concentrically with the burner and fitted with a vertical plug. The last form of combined cock is easy to manufacture and more satisfactory to use.

The first "Nürnberg" burner developed light at the rate of one Hefner unit per 0.7 liter—*i. e.*, 36.8 candles per cubic foot when in good condition—but it has now been so far improved as to yield on an average 51.5 candles per cubic foot. In certain cases, indeed, its illuminating power has been equal to 73.5 candles per cubic foot, with a maximum value of 107. Nürnberg burners are now being manufactured in different sizes, and show the following illuminating powers and duties:

Size of Burners. Mm.	Inch.	Illuminating Power. Candles.	Consumption in Cubic Feet. Coal Gas.	Oxygen.
6 =	0.24	109	1.06	0.88
8 =	0.31	227	1.98	1.98
12 =	0.47	364–455	3.5–4.25	3.5–4.25
19 =	0.75	1,090	8.85	8.85
28 =	1.10	1,820	14.1	14.1
35 =	1.40	2,730–3,640	24.8–28.2	24.8–28.2

The Cost of the Light.—Herr Hansmann next proceeded to deal with the cost of the oxy-gas or "Nürnberg" light in comparison with ordinary incandescent coal gas, on the assumption that one liter of gas burnt in conjunction with an equal volume of oxygen developed light at the rate of two Hefners per liter, and that the ordinary incandescent gas burner afforded 100 Hefners per 140 liters, or 18.6-candle power per cubic foot. The speaker founded his calculations on the basis (translating his metric data into English figures) that 1,060 cubic feet of coal gas could be made from 220 pounds of coal by means of the heat evolved during the combustion of 35 pounds of coke, a quantity which would generate sufficient energy to yield 281 cubic feet of oxygen in a factory of roughly equivalent capacity to the coal gas works, which was supposed to be of "medium" size. As oxygen did not burn, but required an equal volume of coal gas to be used with it, it was necessary in calculating to add 281 cubic feet of coal gas to both sides of the equation; whence it appeared that (1,060 + 281 =) 1,341 cubic feet of coal gas consumed by itself in an ordinary incandescent burner would afford approximately 27,000 Hefners, whereas 281 feet of coal gas consumed with 281 feet of oxygen would afford 32,000 Hefners.

It was also necessary to understand that the cost of generating oxygen decreased much more rapidly with every increase in the amount produced than did the cost of making coal gas; for while the amount of energy consumed in preparing oxygen from the atmosphere might fall from 4 to 1½-horse power hours per cubic meter, as the operation was conducted on a larger scale, the quantity of coke used in carbonizing coal would only fall from 18 to 12 per cent. by weight of the coal consumed.

At the prices ruling in Austria, Herr Hansmann estimated that the actual working costs of producing oxygen were about 77 cents per 1,000 cubic feet; so that if an addition of 75 per cent. were made to them for depreciation, interest, etc., the total manufacturing costs might be said to be about $1.33, which would allow the gas to be sold at about $1.75 per 1,000. If ordinary coal gas were sold at $1.18 per 1,000 cubic feet, the data already given showed that 100 Hefners could be developed in the Nürnberg burner for a cost of 0.250 cent, whereas a similar quantity of light produced by the Welsbach incandescent burner would cost 0.56 cent. The capital cost of erecting a factory for providing Nürnberg light over a district—*i. e.*, a combined coal gas and oxygen works—was naturally higher than that required in the construction of a simple coal gas works; but the double main did not involve so great an additional outlay as might be thought. Indeed, the author stated that for a given number of lights the capital cost of a Nürnberg factory would be 1.2 units of money if the cost of a gas works were 1 unit. The Nürnberg factory, too, would appeal to many consumers for whose purposes a supply of ordinary coal would not suffice, inasmuch as the supply both of gas and of oxygen would enable the autogeneous soldering of metals to be carried out—a process that was constantly growing in importance.

The Huxley Steam and Oil Separator.

Gravity and centrifugal force are not the principles relied upon to remove oil and water from steam in the separator, now being introduced by Messrs. C. E. Huxley & Co., Clinton street, Chicago. The separator, cast in one piece, is of the horizontal type, and the cross-section view of the apparatus shown in Fig. 1 discloses its internal construction and method of operation.

Steam is admitted through the top opening at the right and encounters at once the fluted baffle plates F^1, upon which the waters of condensation and oil adhere and drain into a central tube E^1, leading to the product chamber *D*. The steam mainly follows the same course, and rises through an annular opening *G* in the deflector plate at the top of this chamber. After encountering another baffle in the shape of the projected lower half of the outlet pipe, it escapes through the outlet *C*. The contents of the product chamber are drawn off through a drain pipe d^1 in the bottom of the separator. Fig. 2 shows a cut-away section opposite the inlet, the position of the opening being indicated by the light circle *f*. The water and oil arrested by the baffle plates are carried downward to the product chamber by the flow of steam, and there restrained from following it upward by the deflector wall between the upper and lower sections.

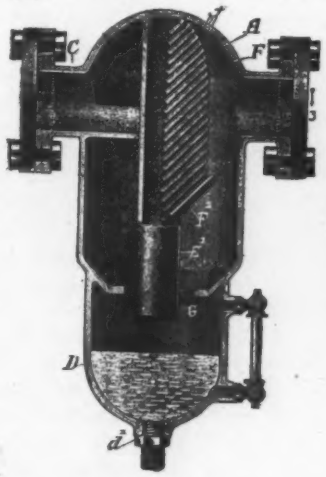


Fig. 1.

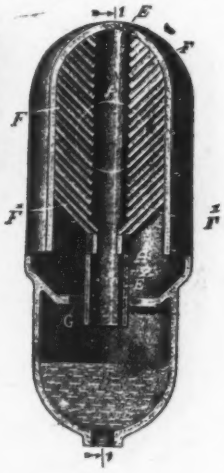


Fig. 2.

Tests made at the Armour Institute of Technology with a 3-inch Huxley steam separator placed in the exhaust line of a 6 by 9 by 14-inch cross compound engine, exhausting into a 22-inch vacuum and also at atmospheric pressure, gave the following results:

	Exhausting into 22-Inch Vacuum.	Exhausting Atmospheric Pressure.
Weight of oil fed through lubricator per hour, pound	0.420	0.641
Oil caught by separator, pound per hour—A	0.328	0.592
Oil passing separator per hour, pound—B	0.012	0.010
Percentage of oil in condensed steam, by weight, per cent	0.002	0.00187
Efficiency of separator, per cent. $\frac{A}{A-B}$	96.5	98.3

Pure mineral oil compounded with 3 per cent. acidless tallow was used in this test, and a record was kept of the exact quantity of oil fed per hour. Although an apparent gain in efficiency is shown when exhausting against atmospheric pressure, the amount of oil per pound of exhaust steam passing the separator is, in both cases, practically the same, being about 2 parts of oil to 100,000 parts of water by weight. The separators are made in sizes from 1¼ to 10 inches in cast iron and from 8 to 20 inches in steel.

The Dangers of Contact with Electrical Current.

Herr Hermann Zipp, lecturer at the Municipal Polytechnic at Cothen, through the columns of the *Chemiker Zeitung*, in noting the danger to human life introduced by accidental contact with an electrical current, comes to the conclusion that the extent of the injury is not entirely due, as is generally imagined to be the case by non-technical people, to the voltage of the current, but partly or mainly depends on the quantity of electricity which is caused to flow through the human body and upon the parts of the system to which it penetrates. The experiments that have been carried out on the physiological influence of electrical currents show that a part of their effect is due to their electro-chemical action upon the liquids of the body, and part to the injury done to the most important organs by contact with the current of electricity. The following facts have indeed already been established: (1) When a current flows from hand to foot under the worst conditions, that is to say, when a man's boots are thoroughly soaked with water and his hands are damp, the reristance of the human body is on an average 5,000 ohms. (2) When an alternating current of 5 milliamperes with 50 complete alternations per second flows through a person, the effect is sufficiently marked to produce muscular contraction; hence in the author's opinion a current of from 50 to 100 milliamperes must be undoubtedly considered as dangerous to life, provided it comes into the neighborhood of the most important organs of the body. In judging of the degree of danger exhibited by any electrical installation, therefore, the investigator has to inquire whether it is possible that a current of such volume can be introduced into the human system from any part of the plant. The chief sources of danger are, of course, a broken conductor, too highly charged a conductor, and the effect of lightning; but the following points have also to be borne in mind, viz., bad insulation or high capacity in items of the plant, and the conversion in a transformer of a high tension current into one of low voltage.

The author accordingly proceeds to discuss the various accidents that have arisen, or are liable to arise, under four separate headings: (1) Simultaneous contact with both conductors. (2) Contact with only one conductor. (3) Contact with the "charging current" in alternating installations; and (4) dangers introduced during the reduction in voltage of a current.

1. In certain conditions, *e. g.*, a chemical factory or a mine where the atmosphere, etc., is damp, a man may be injured by contact with a 110-volt current; because his personal resistance, being lowered to 5,000 ohms, as already stated, he may receive a current of 25 milliamperes therefrom. It is even possible in some cases, where the air is loaded with acid vapors, that the conductivity of the human skin may be greater still, so that death may be caused by contact with a current of 110 volts. In practice, however, this circumstance does not involve great risk, because it is easier to eliminate the dangers attendant upon an electrical plant than those of any other form of machinery. In the reports covering the year 1905 issued by the Prussian "Regierungs und Gewerberate und Bergbehorden" (Factory and Mining Inspectors), seven fatal cases and two severe accidents caused by electrical currents were mentioned. Two of the fatal cases were due to willful carelessness; the third was caused by a workman interfering with a transformer; the fourth to a man unnecessarily passing between a switchboard and a high tension transformer; the fifth to a man accidentally making contact between the metal cage of a hand lamp running with an alternating current of 110 volts and a water main, the insulation of the lamp having become defective. (This accident will be referred to again later on.) In the sixth case a man slipped when he was erecting a conductor to convey a 130-volt alternating current, and made contact between it and the end of a wire lying on the ground. In the seventh case a man was killed with a 500-volt current. In one of the non-fatal cases a man touched the collector of a 120-volt machine with damp hands, and was rendered speechless for 3 weeks. The reports of the Prussian mining officials for the year 1905 contain accounts of ten fatal accidents in connection with electrical plants, several of which were due to gross carelessness or want of foresight. In every case where death resulted it was shown that the damp air in the workings underground was a very important factor in the case, lowering the resistance of the human body so much that a current of 220 volts was sufficient to produce death. A very curious accident occurred some years ago in the town of Cothen. The owner of a bathing establishment, who knew little of electricity, had the idea of installing an electrical bath. He fitted up a pair of electrodes at the two ends of a slipper bath, connected them with the 120-volt alternating circuit of a neighboring supply, and tested the effect upon himself. At the moment of entering the bath he received a shock from head to foot, and, owing to the resistance of his body being lowered by contact with the water, the effect was instantaneous death.

In a large number of cases simultaneous contact with the two wires of a circuit produces no effect at all, either because the man's skin is dry and so forms an excellent insulator, or because the current passes without coming near any critical organ. For example, some time ago the writer himself accidentally placed one hand between the two contact pieces of a 1,000-volt transformer in such conditions that the current passed for a distance of about 2 inches through his flesh. The effect was a severe shock to the system and a momentary combustion of the skin, but no further ill effects followed. If, however, the contact had been made with both hands, a current equal to 100 milliamperes would have passed through his system even if his resistance had been as high as 10,000 ohms, and death would have certainly resulted. It is, therefore, clear that arrangements should always be made to prevent the possibility of simultaneous contact with both conductors of a circuit, either by compelling the men to wear rubber shoes and gloves, or, preferably, the complete suit of clothing designed by Prof. Artemieff. This consists of a garment woven out of stout linen with a layer of fine copper wire, and is so formed as to inclose the whole body. If a man wearing this clothing makes contact with both high tension conductors, the current passes via the copper wire and practically none enters his system.

Special care is required is using portable electrical apparatus, such as hand lamps and motors, when the atmosphere is damp. It is always possible that the insulation of such appliances, especially the boring tools used in mines, may become injured, so that the casing of the motor or the cages of the lamps may receive current—as evidently happened in the fatal case mentioned above. The best method of dealing with such apparatus is to provide the casings and cages with earth wires, but it is necessary to see that the earthing is really effective.

2. *Contact with One Conductor.*—When a man makes personal contact with the two conductors of an electrical circuit simultaneously, nearly always gross carelessness is involved, but it is a much commoner thing for him to touch one of the conductors. Inasmuch as no perfect insulator exists, at every spot where a conductor is supported, some leakage of current to the earth occurs. The amount of leakage at any single insulator is negligibly small, but in a very long circuit, where large numbers of insulators are employed, especially in a damp atmosphere or one charged with acid vapors, the total losses of current are serious. Now, if a man standing on the damp ground touches one of the conductors, a current passes from the wire, through him, to earth, and returns via the numerous insulators of the other conductor; and the greater the number of insulators on the circuit the more dangerous is the current that enters his body. In this particular case clearly it is not the voltage of the current which is of chief importance, but the length of the conductors in the circuit that are supported on insulators. The case mentioned above where a man received a fatal shock by contact with the wire cage of a glow lamp, could only have occurred in an extensive electric system, provided, of course, that the wiring had been done properly. The author has intentionally touched the wires of an alternating electrical current about 150 feet long, in which the pressure of the current ranged between 3,000 and 5,000 volts. The insulation of the conductors not being defective, he experienced no ill effects, but had the circuit been several hundred feet longer still, some harm would have been done to him. Hence it follows that arrangements should be made preventing the possibility of contact with a single conductor of any electrical plant, even if the pressure is low, except under such conditions as when a man has his hands or feet properly insulated.

3. *Contact with the "Charging Current" in Alternating Installations.*—When the two coatings of a Leyden jar are connected with the pole of an alternator they receive alternately positive and negative charges, and the quantities of electricity necessary to produce these charges must flow through the wires. The quantities of electricity pulsating in the wires under the conditions mentioned, may be termed

"charging currents," and are sufficiently large to be indicated by an amperemeter, or, if the Leyden jar is large enough, by causing an incandescent lamp to glow. The larger the size of the Leyden jar, *i. e.*, the condenser, the larger are the amounts of electricity stored in it, and the larger is the charging current. Every conductor of electricity forms such a condenser with the earth, and if a man touches one conductor, his body acts as the wire of the condenser, conveying the charging current to earth. The other coating of the condenser is the untouched conductor and is obviously connected with the source of alternating current. Hence, through the body of the man flow the charging currents of the condenser which is formed of the earth and the second condenser; and if the latter is large enough, that is to say, if the conductor is long enough, the charging current may be of sufficient volume to cause death. This charging current is the chief cause of fatal accidents when contact is made with a single high pressure wire, because the currents due to faults insulation, which have been previously discussed, are usually far too small in amount to be of importance. In the particular case now under contemplation the length of the distributing system is far more serious than the voltage, and it may, therefore, be said that every high pressure installation is dangerous when only one conductor is touched, provided a man's hands or feet are not well insulated. Armored lead cables are especially dangerous, owing to their high capacity, and contact with them is likely to produce worse results than contact with a naked wire.

From what has already been stated, it is evident that, more particularly in cases where the installations are employed in a moist atmosphere, there is danger, not only in simultaneous contact with both conductors, but also in contact with one. Escape of current is particularly liable to occur from badly built switchboards and similar apparatus, although such escape can easily be prevented by proper construction. It is very necessary that new installations or enlargements to existing plants should only be made under the supervision of men who understand the matter thoroughly.

In this connection it may be of interest to quote some figures from the reports of the German factory and mining inspectors for the year 1904. According to this report, between 200,000 and 250,000 accidents occurred throughout the Empire in the year under consideration. Of these about 1,000 accidents were fatal, 16 being due to electrical current and 28 to machinery shafting, etc. The figures relating to accidents in mines are very interesting, as showing how extremely few cases have been due to electricity. Some of the figures quoted in the government reports for different years are given in the following table:

Year.	Electrical Current.	Explosions.	Falls of Earth, etc.
1899	4	26	394
1900	2	20	403
1901	2	59	431
1902	4	10	391

4. *Dangers of Transformations.*—In this section of his article Herr Zipp briefly refers to the danger experienced by a man who receives a current in the neighborhood of a transformer. As the insulation of a high tension circuit is much better than that of a low tension circuit, the current which always tends to escape from the former to earth often finds it easier to pass first to the low tension circuit and then to earth. If, now, the resistance between a low tension circuit and the earth is 20,000 ohms, and a man, the resistance of whose body is 10,000 ohms, approaches that circuit, he may receive a part of the current which is on its way via the low tension circuit from the high tension circuit to the earth. The risks, indeed, are practically the same as those when direct contact with a high tension circuit is made accidentally.

In a final paragraph the author refers to the very high voltages (namely, such as 100,000 volts), which are not dangerous to man when the frequency of the current is very great, reaching, for example, 100,000 alternations per second; and he ascribes the harmlessness of these Tesla currents to their passage along the outer surface of a conductor, so that when the conductor in question is a human being the critical organs of his body are not affected by them.

In a later issue of the *Chemiker Zeitung*, Dr. H. Danneel, of Friedrichshagen, criticizes certain features of Herr Zipp's article. He takes it for granted that the physiological effect on the human body of an electrical current is due to electrolysis; *i. e.*, to the migration of the ions in the living cells. Hence, the only important question is the number of coulombs of current which enter the system, not the number of amperes. He, therefore, regards the harmlessness of Tesla currents as due to the extremely minute quantity of electricity per phase, which causes the alteration in concentration in the cells of the human body to be insignificant. In a brief rejoinder Herr Zipp disputes the accuracy of the purely electrical view propounded by Danneel. As stated in his main article, he attributes much of the effect of an electrical current upon a person to its electro-chemical action, but the influence on the nerve centers—that is to say, the shock produced by the current—must not be neglected, and the magnitude of this shock would appear to be, to some extent, a function of the voltage.

SPECIAL ENGLISH CORRESPONDENCE.

COMMUNICATED BY NORTON H. HUMPHRYS.

SALISBURY, ENGLAND, Sept. 10th, 1907.

The Position and Prospects of the Gas Industry.—Cutthroat Competition in Gas Supply.—Fifty Years a Director.

The half-yearly or yearly meetings of the shareholders in the various gas undertakings throughout the country, at which the accounts for the 6 or 12 months ended June 30 last were submitted and discussed, or rather supposed to be discussed, have for the most part been held, and, as usual in prosperous times, the chairman's eloquence has as a rule been lost upon empty benches. Every shareholder receives an advance copy of the accounts, but it would appear that not one in a hundred takes the trouble to make an intelligent examination, and that a plain statement of the amount available for dividend would in effect answer every purpose. I once happened to hold shares in a concern which had an unfortunate experience. Just before the shareholders' meeting the secretary was missing and also the balance available for dividends. There was a large attendance on that occasion, and none could complain of a lack of interest in the proceedings. But the same company, a week or two ago, when there was a good balance of profit, barely had a sufficient quorum for the transaction of the business. One can scarcely complain, considering that such absence is practically a vote of confidence in the management. Yet at the same time it would be better, in the interests of the undertaking, if a few intelligent business men were to attend the meetings and discuss the position and prospects. This particularly applies to shareholders who are interested either as customers or employees of the company, for it is remarkable that both these classes, who are frequently as much involved in the progress of the concern as the shareholders, are rarely represented. Another remarkable thing is that holders of gas stock sometimes do not even patronize gas in their own houses or businesses, and rarely trouble to recommend it to their friends; whereas people interested in other things both use them personally and recommend them. If every shareholder in a provincial gas company who happened to reside in the district—and very often this would practically represent the whole of the capital—was as active in using and recommending as those who are connected with banks, insurances and many like ventures, the manager would have a lovely time and a staff of canvassers would be a superfluity, while the sales would be something like double. As it is, I could name people who draw hundreds of pounds in dividend, but whose account with the gas collector might be reckoned in shillings.

There is a striking unanimity in the statements presented at the various meetings, and it is evident that the past year has in some respects been one of almost exceptional prosperity. Sales have been well maintained and coal has been fairly cheap. The demand for cookers and automatic meters is not yet satiated. The last few years have witnessed a striking increase in the popular ideas respecting public lighting. Until the opening of the present century the general practice was 4 or 5-foot flat flame burners spaced out 100 yards apart. It was simply darkness visible—and a low lighting rate. But with the introduction of incandescent gas burners, we find that the street illumination is 6 to 10 times more brilliant. Even small villages put up 100, 200 or 300-candle burners. All this, of course, means more gas, even after allowing for the lower consumption of the Welsbach burners. And quite 9-tenths of the public lighting is effected by means of gas, the electric arc being in a decided minority. It is safe to say that the consumption of gas for public lighting has largely increased, and where there is a good business in public lighting there is sure to be an equally good demand for private lighting. The demand for coke has been good, and stocks generally are lower than they have been for some time. Sulphate of ammonia has been quiet, and tar very dull. A great deal has been said as to the use of tar as a dust preventer on the public roads, but as yet there is no evidence of a large demand for that purpose.

The coal question was the chief feature of interest, not so much in respect to the immediate present, as in regard to the future. Most gas undertakings buy at least a year in advance and they therefore know the worst up to next midsummer. So the question of daily or weekly fluctuations, which is so important to the user who buys from hand to mouth, does not interest them. They also enjoy the advantage that one of their residuals, coke, follows the price of coal to some extent, and that at least one-third to one-half of the advance is recoverable in this direction. Some who were sailing close to the wind have advanced the price of gas to meet the increased cost of coal, which ranges from 2s. to 4s. per ton as compared with last year. A larger

number who would otherwise have been able to reduce the price have decided to sit tight for another twelvemonth. So there are many industries that are more seriously affected by dear coal than gas, such as those without sympathetic residuals, or who by dint of competition are prevented from increasing output prices. Parties in this position cannot afford to look on the prospects of the coming winter with equanimity. There is no doubt that if cold weather sets in early, high prices will obtain, for the mine owners, miners and coal merchants are always a happly family when the prospect of a boom is in the air. There is some uncertainty as to the effect of recent legislation on the permanent price of coal, but the general position of manufacturing trade is such that it will not bear a prolonged period of dear coal, and no one knows this better than the parties who are now agitating for higher prices.

We are in the habit of priding ourselves, and not without reason, on the advantages of districting and a regulated monopoly; that is, freedom from competition with certain limitation in respect to prices and profits, that are a part of our legislative system in regard to the supply of gas. Under such regulations the consumer secures gas at the lowest practicable price; viz., the fair working expenses plus current rates of interest on the capital investment. It is impossible to conceive of any fair business method that would admit of more favorable terms. This order of things is so regularly established that the account of the state of affairs at Draycott, a small district near Nottingham, which is going the rounds of the technical press, reads like an item from another world, or at least another country. By some oversight, two separate and distinct undertakings have been granted Parliamentary powers to supply gas in this district, and it does not appear that such dual control is likely to prove beneficial to any one concerned. Some 30 years ago the Long Eaton Gas Company was formed, and as is not unusual, obtained powers of supply over an extensive area, very much larger, in fact, than they immediately intended to exploit. While getting an Act, there can be no harm, it is supposed, in including every township within 10 or 12 miles, and in this manner the Long Eaton Company covered the district of Draycott. Matters went on for some years until Draycott wanted a supply of gas. Whether the Long Eaton people had overlooked their rights, or whether they did not think that Draycott would be of any use to them, does not appear, but at any rate Draycott was allowed to form a company of its own, and to obtain statutory powers. They have been in operation for 20 years, giving satisfaction to their consumers by selling a good article at a low price. While Long Eaton has been charging 2s. 8d., Draycott has been selling at a little over 2s. But the Long Eaton Company have now roused to a sense of their rights, and endeavored to regain the supply of Draycott by running a main through the district, offering to supply fittings free, and gas at 2s. per 1,000 cubic feet. This action, as might be expected, has not received much support, either at Draycott or at Long Eaton. The Draycott consumers are quite satisfied with their own supply, as being cheaper than Long Eaton, and do not welcome the newcomer. While the consumers at Long Eaton are asking how it is that an outlying district can be supplied on substantially better terms than the home consumers. The Draycott people shrewdly suspect that the present terms will only be continued until the local Company has been extinguished, and then that the Long Eaton rate will prevail throughout. And the Long Eaton consumer is asking whether the 2s. 0d. rate is or is not remunerative. If the answer is in the affirmative, then he concludes that the present Long Eaton rates are exorbitant. If on the other hand there is a loss on the 2s. rate, he wants to know who is going to bear the deficit. Another point that appeals to the Draycott consumer is that the old powers of the Long Eaton Company, that have so long been neglected, give authority to charge 1s. per 1,000 cubic feet more at Draycott than at Long Eaton. By this means the Draycott people could be made, eventually, to bear the cost of smashing up their own concern. Some of the Long Eaton shareholders are wanting to know what is the prospect of a reasonable profit on the large outlay involved in carrying the main to Draycott, and it will not be an easy matter to furnish a satisfactory reply. The legal point concerned is a somewhat nice one. It may be argued that Long Eaton, having once covered the district, similar rights could not be enjoyed by a second company. But the popular idea will be that the Long Eaton Company should have exercised the privilege of supplying gas over the district, or should have opposed the Draycott Company, and that by their inaction in these respects they have forfeited their claims. It certainly appears that a company having rights over a large district should be prepared to supply in any part, or on the other hand refuse to do so and leave the coast clear for others. It is easy to conceive that an undertaking may obtain powers over a district of 20 or 30 miles square, and act the part of the dog in the manger towards three-fourths of the area covered, refusing to supply gas till it suits them to do so, and at the same time obstructing local enterprise. The progress of events at Draycott and the results of the action of the Long Eaton Gas Company will be watched with considerable interest.

A special and indeed almost unique feature of the meeting of the Eastbourne Gas Company was the fact that the Chairman, Dr. Jeffery, has completed 50 years as a director of the Company, and the occasion was not allowed to pass unrecognized. At the conclusion of the business a massive silver salver was presented from the shareholders, whilst the officials handed up a silver rose bowl for Mrs. Jeffery, and the senior officer, Mr. H. E. Jones, the Consulting Engineer, gave a framed likeness to the family. The reports presented at the business meeting would indicate that, though advanced in years, the Chairman retains his full powers. It must have been a satisfaction to him, as well as to his colleagues, to be able to show that the interests of both consumers and shareholders had not suffered under his guidance. In referring to the event the local press does not overlook the work of the chief executive officers, Mr. Garrard, the Secretary, and Mr. J. Hammond, the Engineer and Manager.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

It is said that the Crahen-Hendley combination really mean to build a gas works in Platteville, Wis. The incorporation of the Platteville Gas Company, with a capital of $50,000, has heretofore been noted in the JOURNAL.

At the annual meeting of the Lead-Deadwood Gas Company, of Lead, S. D., the officers elected were: Directors, J. A. Bowers, P. D. Smith, J. D. Brooder and S. E. Crans; President, P. D. Smith; Vice-President, J. D. Brooder; Treasurer, R. S. Jamison; Secretary and Manager, H. A. Daum.

A CORRESPONDENT in Boston, Mass., writing under date of the 21st inst., incloses the following: "The division Superintendents of the Boston Consolidated Gas Company held the first monthly meeting of the third year at the Parker House, last Thursday evening. It was preceded by a dinner over which the President of the Company, Mr. James L. Richards, presided. About 48 guests were present. In opening the after-dinner preceedings President Richards said that the monthly meetings of the 'Captains of the gas industry' of Boston had always proved beneficial. There had been no break in the ranks because of death since the meetings were begun, and no removals due to inefficiency. He referred to a small gift placed at the plate of each diner, a gold watch charm in the shape of a miniature gas meter. The initials of each recipient were engraved on his charm, and added was the inscription, 'from J. L. R.,' which meant that it was a personal gift from Mr. Richards. Mr. Richards said it was a token of the good times they had together. Continuing his address, Mr. Richards said that in meeting the demand for increased facilities, the executives of the Company had been doing in the past few years what should have been done in the past 10 years, and in consequence had been extremely busy. The new purifying house in Everett, now about completed, was the largest of its kind in the country and cost $200,000. There was also being constructed in Everett a new water gas plant on the site of the Consolidated Gas Company's works, which would have a capacity of 10,000,000 cubic feet. He said the new Cambridge bridge was the best gas lighted thoroughfare in the world and a fine advertisement for the Company. He urged a visit to it at night on the part of those who had not already done so. Since the Consolidated Company had taken hold, Mr. Richards said, improvements amounting to $2,000,000 had been and were in the process of construction. He said the Consolidated Company had reduced the cost of gas 5 cents per 1,000 feet; the Chelsea Company had done the same, while the East Boston Company had made a reduction of 20 cents per 1,000. This has been done, he explained, in the face of the advancing cost of material and commodities. It verified, he declared, the Company's claims to efficiency. It also had brought in less than 2 years a saving of $800,000 to the citizens of Boston, $33,000 to the citizens of Chelsea, $46,000 to those of East Boston and $15,000 to those of Quincy. There had been an increase of business of 8 per cent. in the Consolidated Company during the period above stated, of 27 per cent. in the Chelsea Company, of 26 per cent. in the East Boston Company and 75 per cent. in the Quincy Company. The Consolidated Company, after paying dividends and setting aside $50,000 to be divided among the employees, had made an improvement of $53,000 net. The stockholders were well pleased, Mr. Richards said, as well as the public and the employees. Among the employees of the Consolidated Company $50,000 distributed annually and 681 employees will continue to be profit-sharers as planned. He hoped that the effort to extend this and include the employees of the other companies would be successful. It was gratifying, he said, to see the Boston Consolidated Gas Company held up as a model as a public service corporation. This was shown by the press reports throughout the country. Mr. M. C. Brush, Vice-President of the electric lines operating in Newton, Waltham, Watertown and Wellesley, was a guest. He said that the street railway conditions were worse in Massachusetts than in any other part of the country. He was glad Mr. Richards had been chosen as President of 10 lines operating 150 miles of tracks in the suburbs, and felt sure that Mr. Richards' management would have much to do towards accomplishing many improvements. Capt. W. E. McKay, Engineer in charge of construction, was another speaker. He told of an interesting discovery during the excavation at Calf Pasture, Dorchester, where there were revealed remains of a forest 5,000 years old. In Everett at 30 feet depth parts of a forest equally ancient were found. Just before the meeting was adjourned a vote of thanks was extended President Richards for the pretty watch charms and the Company for shares of profits."

MR. LOUIS N. YETTER, who for several years was Manager of the Public Service Corporation's branch at Englewood, N. J., has resigned that position to accept the place of Superintendent of the William Kane Manufacturing Company, of Philadelphia, Pa. Mr. Yetter will to a certainty be a good man for the Kane concern.

MR. ERVIN BALCOM, formerly of Aurora, Ills., has been appointed head works' man, in charge of the manufacturing and distributing divisions of the Chattanooga (Tenn.) Gas Company.

MR. GEORGE A. BECK has been selected to assume a place of trust in the office force of the Goshen (Ind.) Gas Company.

THE Taxpayers' Association of Portland, Me., is out with the unreasonable demand on the local Gas Company that it shall furnish gas at a rate not to exceed $1 per 1,000 cubic feet. That figure, provided even a 16-candle coal gas is to be supplied, would soon put the Company out of business.

THE Boston (Mass.) *Herald* must be a pretty good sort of news vendor, for some days ago it gave five paragraphs "to a mentioning" of its "oldest continuous subscriber," who happens to be Mr. John Gillcreast, Superintendent of the Woburn (Mass.) Gas Light Company. Our expressed thought respecting the *Herald's* "goodness" springs from the fact that if it were not good John wouldn't have taken it for so great a length of time—53 years, in all.

MR. A. A. KNUDSON, of New York, whose recent article on "Electrolytic Corrosion of Iron and Steel," published last month, has been appointed to act as expert in connection with the litigation between the Toronto Street Railway Company and the Consumers Gas Company, of Toronto. Associated with Mr. Knudson are Mr. W. E. Foss, of Boston, and Mr. L. C. Anderson, of Franklin, O.

MR. JOSEPH M. BERKLEY, of Los Angeles, Cal., under date of the 18th inst., writes us:

"Dear JOURNAL: A very peculiar explosion recently occurred in the gas works of the Edison Electric Company, at Ocean Park, Cal. A car of ordinary crude oil, of about 20 specific gravity, had been unloaded. For some unknown reason the man who connected the oil car to the oil line put the lid back in position and partially screwed it down. About 3 hours after the car was unloaded he proceeded to disconnect it, removing the cap so as to close down the valve. It was when he was removing the cap that the explosion occurred. It hurled him several feet, and the lid rose straight in space with strength sufficient to sever the trolley wire—the works are on the line of an electric railway (which, of course, added to the trouble)—the lid falling about 200 feet away from the car. Investigation revealed the fact that the metal hose connecting the car had formed a connection between the rails of the road, thus charging the car. In removing the cap a spark occurred, when the gas became ignited and the explosion followed. This short recital of an odd experience may be valuable to other companies situated on electric switches and using metal hose for connecting cars to oil lines."

THE Elmer (N. J.) Gas Light and Fuel Company has applied for a charter. It is not proposed to construct a works there, the plan being to pipe the district and purchase gas at wholesale from the Company which furnishes it to Pitman, Glasboro and Clayton.

ON or about January, 1908, the gas works at Chicopee, Mass., will be shut down, by virtue of a contract entered into with the Springfield Gas Light Company, under which the latter will furnish gas to the holders of the Chicopee concern. It would seem that the Chicopee folks could well manage to maintain an independent works on an annual output of 40,000,000 cubic feet.

WE are indebted to Mr. J. A. Haslett, Sales' Manager of the Mobile (Ala.) Gas Company, for a copy of his latest compilation in respect of his campaign in that city, for the further introduction of gas as a fuel. It is entitled "Hints for the Season of 1907 and 1908," and much of it is given over to a listing of the specialties of the Stamford Gas Stove Company.

A CORRESPONDENT in Philadelphia incloses the following under date of the 22d inst.: "Changes in the management of the West Penn (Pa.) Railways and Electric Company take place November 1st, with the removal of the offices of General Manager from Connellsville to Pittsburgh, and the appointment of Mr. George Folds, of Chicago, as Assistant Manager, to have charge of the Connellsville offices. Mr. Folds does not assume his new duties until November 1, although General Manager Moore will move to Pittsburgh within the next few weeks, and in addition to his duties as General Manager of the West Penn system, Mr. Moore will hold a consulting position in the many other interests, including certain mammoth water power developments in Idaho. It is principally because of his connection with these interests that he is being brought to Pittsburgh, in order to be in close touch with President W. S. Kuhn of the West Penn. Mr. Folds, of Chicago, will hold the position of Assistant Manager and will attend to the many details that have been handled by Mr. Moore. General Superintendent L. H. Conklin and Superintendent of Transportation, J. W. Brown, will continue to exercise full charge over their respective duties as heretofore and the proposed change will not affect them in any way. It is with regret that the many friends of Mr. Moore will see him leave Connellsville. He has been here for a number of years and was decidedly popular among his many acquaintances."

THE Coal Products and Power Company, organized to manufacture and deal in gas, gas generators and gas engines and other gas or electrical devices, has filed articles of incorporation in Detroit, Mich. The concern is capitalized in $1,000,000, and the main one in interest is Mr. W. H. Cone, of Detroit.

PROCEEDINGS in foreclosure have been instituted in the United States Circuit Court against the Peoples Gas and Electric Light Company, of Xenia, O. The Ohio petitioner is the American Trust and Savings Bank, of Chicago, Ills., who alleges as the cause of action that the Company is wholly insolvent and therefore unable to pay its debts. The gas plant is at present shut down.

THE Passadena (Cal.) Consolidated Gas Company has given notice of an increase in its capital stock to $1,000,000. Its present capitalization is $250,000.

MR. W. E. PATTEN has resigned the position of Assistant Superintendent of the Utica (N. Y.) Gas and Electric Company, to take up the supervision of the electric plant of the D. L. & W. Railroad in Hoboken, N. J.

UNDER the contract recently entered into between the authorities of Long Branch, N. J., and the Consolidated Gas Company, of New Jersey, Long Branch will have its arc lamp service (electric) for the next 5 years at the rate of $80 per arc per annum, and for the succeeding 5 years at the rate of $79 per lamp. Under the former contract the city was paying $80 per lamp. One thing the Long Branch summer coterie can unto themselves take credit; that city, as to its central portion and as to its ocean front, was lighted as an ocean summer resort should be lighted—in a fashion that is in no sense niggardly.

IT is likely that the matter of determining a fair rate for the supplying of gas in Buffalo, N. Y., on private and public account, will be reopened by the Public Service Commission.

THE residents of Tacony and Holmesburg, Pa., which thriving settlements are to all intents and purposes now suburbs of Philadelphia, are loudly insisting that the United Gas Improvement Company shall be allowed to put its pipes through their territory. The districts are at present supplied from the publicly owned plant originally built for the supply of gas to the House of Correction, situated between the centers of Holmesburg and Tacony, the great stone walls marking the inclosure of which have often given rise to queries from passengers on through trains over the main line of the Pennsylvania Railroad system. This plant was built in the 70's, and its purpose was to furnish gas to the institution, but later on its scope was enlarged to the extent of giving some gas to the people in the vicinity. The trouble is just as our correspondent writes: "This plant was built more than a quarter of a century ago. Although the demands upon it have been largely increased by the growth of population, the original capacity of the works has never been enlarged." There, you have it.

"W. T. M.," writing from Knoxville, Tenn., under date of the 20th inst., says: "The case of Catherine K. McCubbins against J. C. Woodward, a suit for $5,000 damages claimed by plaintiff for alleged negligence on part of defendant which caused an explosion of gas in the house of defendant, and occupied by plaintiff, was on trial here last week in the Circuit Court, and resulted in a verdict for the defendant on 'peremptory instruction' by Judge Sneed. At the morning session, when the evidence and argument had been submitted, counsel for defendant asked for a peremptory instruction, but this was refused. At the afternoon session, however, additional testimony was put in and the motion for the instruction was repeated and allowed. The plaintiff claimed that she was living in the house at 703 West Church avenue, which was leased by her brother-in-law, George W. Leeson, when a gas explosion occurred. She claimed that she went into the basement to get something that she wanted, and lighted a match to see her way. As soon as the match was lighted, she testified, the explosion occurred, by which her eyes were so badly injured as to render the injury permanent. 'Original negligence' was the main contention of counsel for defendant."

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

THOS. J. CUNNINGHAM,
ELBERT P. CALLENDER,
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NEW ENGLAND ASSOCIATION OF GAS ENGINEERS.

MONDAY, SEPTEMBER 30, 1907.

The Market for Gas Securities.

The rumor-mongers have it that the Public Service Commission for the First District is about to work some hardship on the local gas companies, with the result that traders on sale's account broke the selling price under par—in fact to 97¼. That figure was the opening one this morning, Friday. What basis of truth there was for the rumor is unknown to us; but, in so far as our present light on the subject spreads, we incline to the view that the Commission will soon see that a gross injustice has been done to the local companies, and that that body is quite up to righting wrongs.

Peoples, of Chicago, evidently has reached bedrock, the shares stoutly recovering from every bear attack. Washington gas is again on the move, and wise purchasers in that city are predicting 450 for it within 60 days.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 WALL STREET, NEW YORK CITY.

SEPTEMBER 30.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share.

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$73,177,000	100	97⅛	97⅝
Central Union Gas Co.—				
1st 5's, due 1972, J. & J.	3,000,000	1,000	92	97
Equitable Gas Light Co.—				
Con. 5's, due 1931, M. & S.	1,000,000	1,000	..	105
Mutual	3,500,000	100	190	.
New Amsterdam Gas Co.—				
1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	83	88
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	37	43
1st Mtg. Gold Bds. 5 p.ct.	1,000,000	..	98	104
Northern Union—				
1st 5's, due 1927, J. & J.	1,250,000	1,000	101	103
New York and East River—				
1st 5's, due 1944, J. & J.	3,500,000	1,000	100	105
Con. 5's, due 1945, J. & J.	1,500,000	..	97	101
Standard	5,000,000	100	70	100
Preferred	5,000,000	100	100	125
1st Mtg. 5's, due 1930, M. & N	1,500,000	1,000	100	105
The Brooklyn Union	15,000,000	1,000	98	110
1st Con. 5's, due 1948, M. & N	15,000,000	..	..	102
Yonkers	299,650	500	130	..
Out-of-Town Companies.				
Bay State	50,000,000	50	¾	⅞
" Income Bonds	2,000,000	1,000	..	75
Binghamton Gas Works	450,000	100	..	65
" 1st Mtg. 5's	500,000	1,000	95	100
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	5	8
" " Bonds, 5's	5,250,000	1,000	63	66
Capital, Sacramento	500,000	50	..	35
Bonds (6's)	150,000	1,000	..	..
Chicago Gas Co. Guaranteed Gold Bonds	7,650,000	1,000	104	106¾
Cincinnati Gas and Electric Co.	29,500,000	100	94¼	95
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	92	98
Columbus (O.) Gas Lt. & Heating Co.	1,582,750	100	87	88
Preferred	2,026,500	100	107½	108
Consumers, Toronto	2,000,000	50	200	204
Consolidated, Baltimore	11,000,000	100	..	90
Mortgage, 6's	5,500,000	..	..	115
Chesapeake, 1st 6's	1,000,000	..	..	..
Equitable, 1st 6's	910,000	..	..	..
Consolidated, 1st 5's	1,490 000	..	..	112
Consolidated Gas Co. of N. J.	1,000,000	100	15	17
Con. Mtg. 5's	880,000	1,000	92	95
Bonds	75,000	..	..	100
Detroit City Gas Co.	5,000,000	50	..	50
" Prior Lien 5's	4,618,000	1,000	..	98
Detroit Gas Co., 5's	551,000	1,000	75	80
" Inc. 5's	15,000	100	98½	100
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	..	101
Essex and Hudson Gas Co.	6,500,000	..	39	40
Fort Wayne	2,000,000	..	..	..
" Bonds	2,000,000	..	55	..
Grand Rapids Gas Lt. Co. 1st Mtg. 5's	1,925,000	1,000	104½	105
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	..	103	105
Bonds, 5's	10,500,000	..	101	102½
Indianapolis	2,000,000	..	60	70
" Bonds, 5's	2,550,000	..	104½	105
Jackson Gas Co.	250,000	50	82	..
" 1st Mtg. 5's	220,000	1,000	97	100
Kansas City Gas Light Co., of Missouri	5,000,000	100	..	36
Bonds, 1st 5's	3,333,000	1,000	102	104
Laclede, St. Louis	10,000,000	100	..	105
Preferred	2,500,000	100	95	110
Bonds	10,000,000	1,000	104	104½
Lafayette Gas Co., Ind.	1,000,000	100	..	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	143	145
Madison Gas & Elec. Co.				
" 1st Mtg. 6's	350,000	1,000	106	108¾
" 6 per cent. scrip, due 1910	100,000	25	60	60½
Massachusetts Gas Companies of Boston	25,000,000	100	52	..
Preferred	25,000,000	100	81	.
Montreal, Canada	2,000,000	100	218	218¾
Nashville Gas Lt. Co.	1,000,000	100	110	..
Newark, N. J., Con. Gas Co.	6,000,000	..	56	58
Bonds, 6's	6,000,000	..	137	138
New Haven	2,000,000	25	200	..
Peoples G. L. & Coke Co., of Chicago	25,000,000	100	86	86½
Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage	20,100,000	1,000	..	..
" 2d "	2,500,000	1,000	104	..
Rochester Gas & Elec. Co.	2,150,000	50	88	..
Preferred	2,150,000	50	118	..
Consolidated 5's	2,000,000	..	104½	105¼
San Francisco, Cal.	15,800,000	00	..	..
St. Joseph Gas Co. 1st Mtg. 5's	751,000	1,000	92	..
St. Paul Gas Light Co	1,500,000	100	45	47
1st Mortgage 6's	650,000	1,000	113	116
Extension, 6's	500,000	1,000	112½	115
General Mortgage, 5's	2,455,000	1,000	96¼	..
Syracuse, N. Y.	1,975,000	100	50	55
Bonds	2,047 000	1,000	102	..
Washington, D. C	2,500,000	20	372½	375
First mortgage 6's	500,000	..	..	..
Western, Milwaukee	4,000,000	..	..	..
Wilmington, Del.	600.000	50	220	..

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DIVIDEND NOTICE.

OFFICE OF THE UNITED GAS IMPROVEMENT CO.,
N. W. CORNER BROAD AND ARCH STS.,
PHILADELPHIA, PA., Sept. 11, 1907.

The Directors have this day declared a quarterly dividend of 2 per cent. (one dollar per share), payable Oct. 15th, 1907, to stockholders of record at the close of business, Sept. 30, 1907. Checks will be mailed.

1684-5 LEWIS LILLIE, Treasurer.

Estimates furnished for the erection of complete gas works or the extension and modernizing of old works. All work warranted. Both water gas and coal gas.

EMPIRE GAS IMPROVEMENT & CONSTRUCTION COMPANY,
1628-tf 49 Wall Street, New York.

Position Wanted.

Young man, at present situated in the South, wants a position in the North. Knows thoroughly the operating of gas, water and street railway corporations, and the office work connected therewith as well. Location in Pennsylvania or New Jersey preferred.

1685-2 Address, "L. R. T.," care this Journal.

Position Wanted

As Superintendent or Manager,

By a young married man with 10 years' experience in all branches of the gas business, with both high and low pressure systems, and who is able to install an up-to-date accounting system. Water gas plant in the South preferred. Can furnish references, if desirable.

1686-1 Address, "PROFESSION," care this Journal.

Position Wanted

By married man, 36 years of age. Wishes to better his present position, competent to take charge of coal gas plant, 12 years' experience in all branches of the business, strictly sober, a hustler and can show results. At present employed. Clear record.

1686 4 Address, "HUSTLER," care this Journal.

Position Wanted.

Competent Gas and Electric Light Manager

Is open for position in a town of 15,000 to 25,000 inhabitants. Best of references. Capable of managing all departments. Address,

1686-2eot "M. P.," care this Journal

WANTED,

A FOREMAN THOROUGHLY POSTED IN COAL GAS MANUFACTURE,

For growing city of 15 0 0 population, in the Central West. State experience and wages desired.

1685-2 Address, "X. Y. Z.," care this Journal.

SOLICITOR WANTED.

A capable man with experience, between the age of 24 and 28, to solicit for gas ranges, gas arcs and general appliances, for a town of 50,000 population.

1686-2 Address, "J. C. L.," care this Journal.

GAS BOOKS WANTED.

My library of gas books and subjects akin thereto, and which I believe was the most complete in existence, was destroyed in the April 18, 1906, San Francisco disaster. In re-establishing this library, which will find an ultimate home with a gas association or educational institution, I am desirous of securing all available gas literature printed in the English language, including technical works, reports, pamphlets, etc., and will purchase such as I do not yet possess. Those having such works will accommodate me by sending a description thereof, stating condition of volume and net price desired, carriage included. L. P. LOWE,
1681-2m 1214 Polk St., San Francisco, Cal., U. S. A.

WANTED.

SECOND-HAND, 6-FOOT WATER GAS SET.

State age, condition and lowest cash price.

Address, "SIX-FOOT SET,"
1686-2 Care this Journal.

GAS PLANT FOR SALE.

An A-1 gas plant in a growing Southern town of 10,000 people is for sale. Plant just erected and operating about 9 months. Excellent outlook. Plant is ample for several years to come. Will sell reasonable. Only cause for selling is that the owners do not have the time to spend on it that they should.

Address, "BUSINESS,"
1687-2 Care this Journal.

FOR SALE,

One 48-Inch Station Meter Complete.

It has not been connected since rebuilt 9 months ago by Helme & McIlhenny, Philadelphia, Pa. We refer you to them.

STANDARD GAS AND ELECTRIC CO.,
1686-tf RALEIGH, N. C.

FOR SALE,

1,200 3-Light Meters in Good Condition.

Address, stating number wanted and price you are willing to pay,

PHILADELPHIA GAS WORKS,
1686 3 Broad and Arch Streets, Philadelphia, Pa.

Do You Wish to Know

what size of pipe to use to convey any quantity of gas, any distance, with any loss of pressure and any initial or final pressure? Then use

Cox's Gas Flow Computer,

as it gives this information accurately at sight, without mental effort. No calculations needed. Saves time, money and mistakes.

Price, 6.5 x 8 inches, in cloth case, $2.50.
For sale by
A. M. Callender & Co., 42 Pine St., N. Y.

GAS AND ELECTRIC PROPERTIES BOUGHT AND SOLD.

M. J. LOXLEY COMPANY,

Land Title Building, Philadelphia, Pa.

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Western Gas Construction Co., Fort Wayne, Ind..... 616

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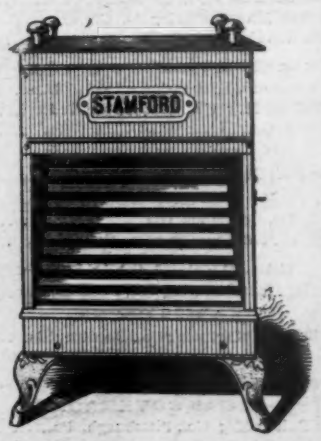

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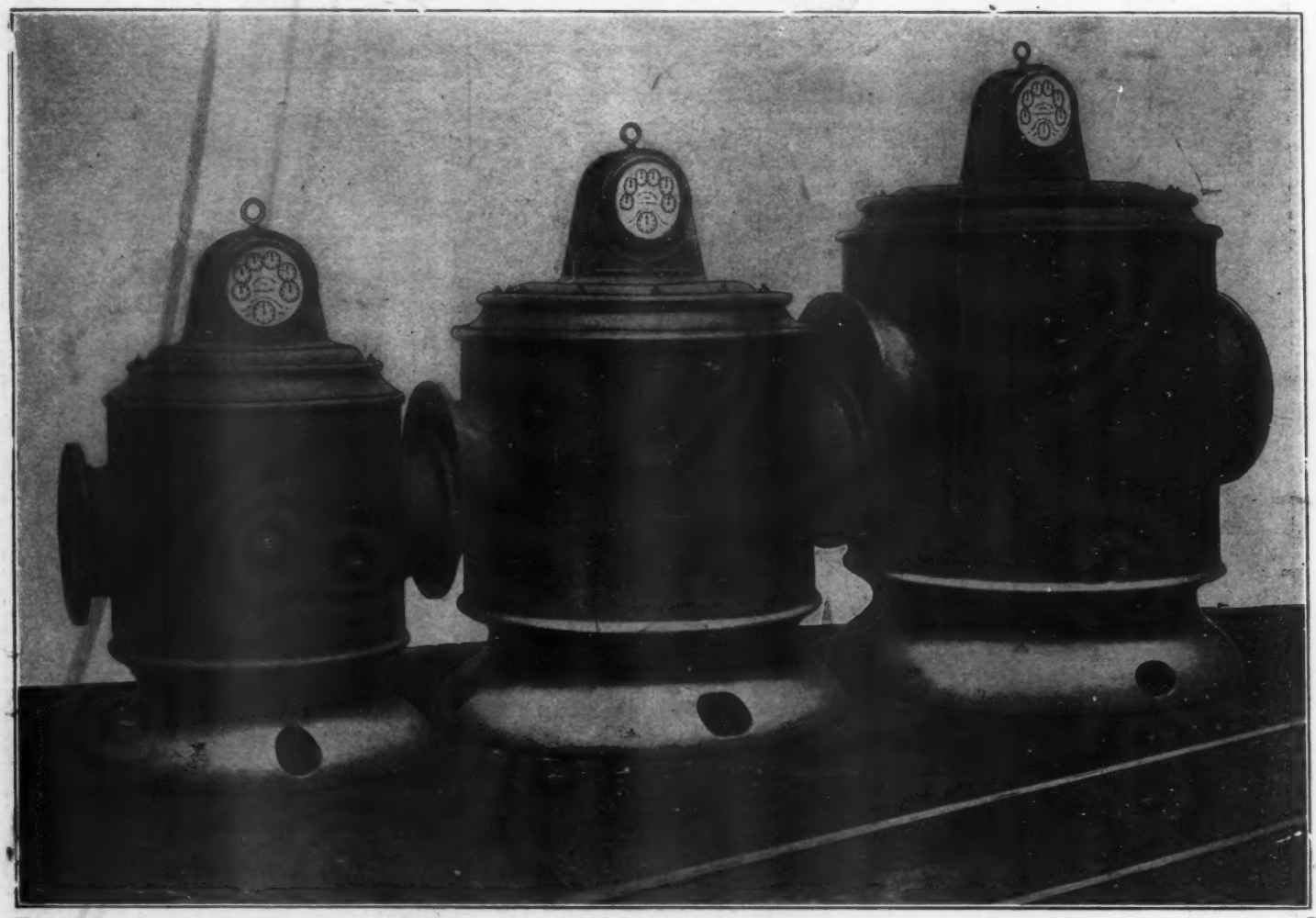

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50 inches floor to c. of dial.	61 inches floor to c. of dial.	70 inches floor to c. of dial.
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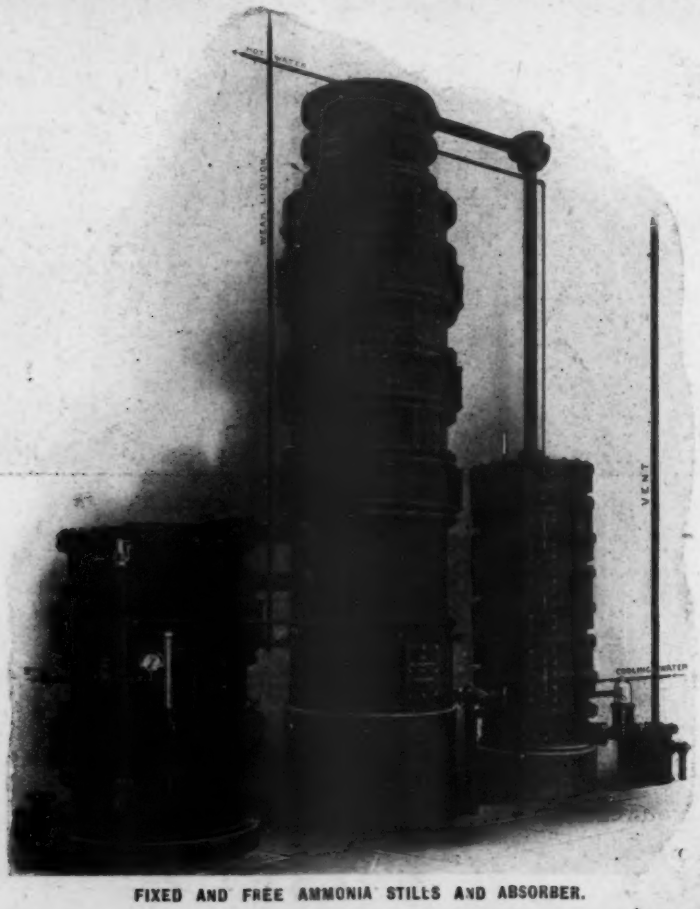

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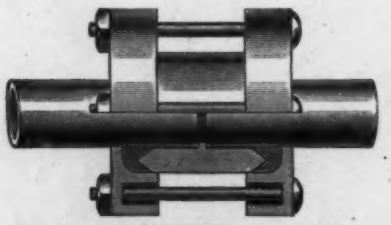
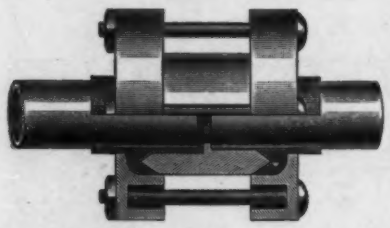
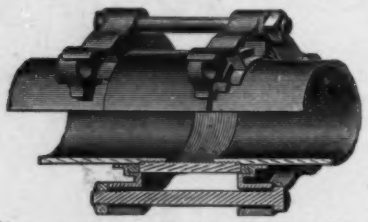


Regular Coupling, Style 1, for Plain End Wrought Iron Pipe.



Insulating Coupling, Style 5, for Plain End Wrought Iron Pipe,



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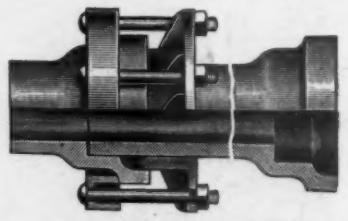
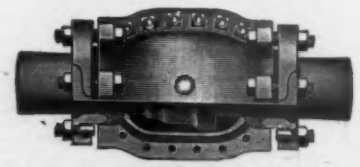
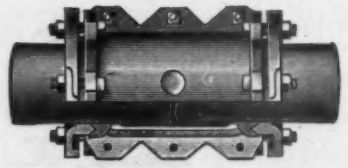


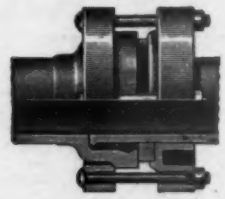
Coupling, Style 9, for Special Style Cast Iron Pipe.



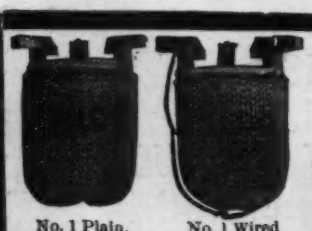
Split Sleeve for Repairing Broken Bell on Cast Iron Pipe.



Split Sleeve for Repairing Broken or Cracked Cast Iron Pipe.



Clamp, Style 4½, for Repairing Leaky Lead or Cement Joints in Cast Iron Pipe.



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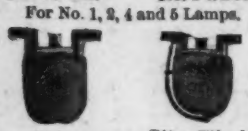

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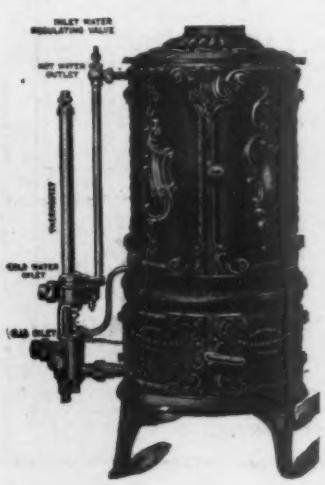

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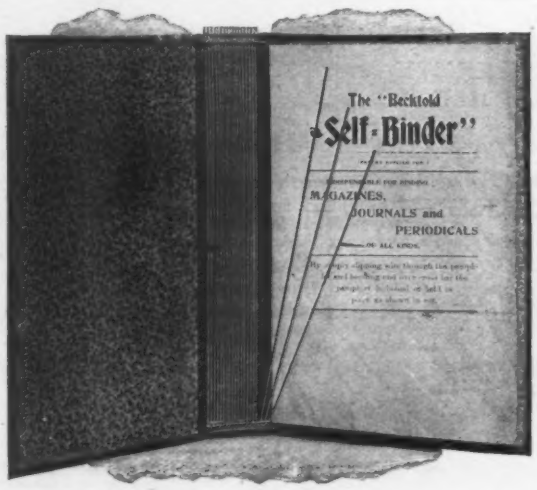

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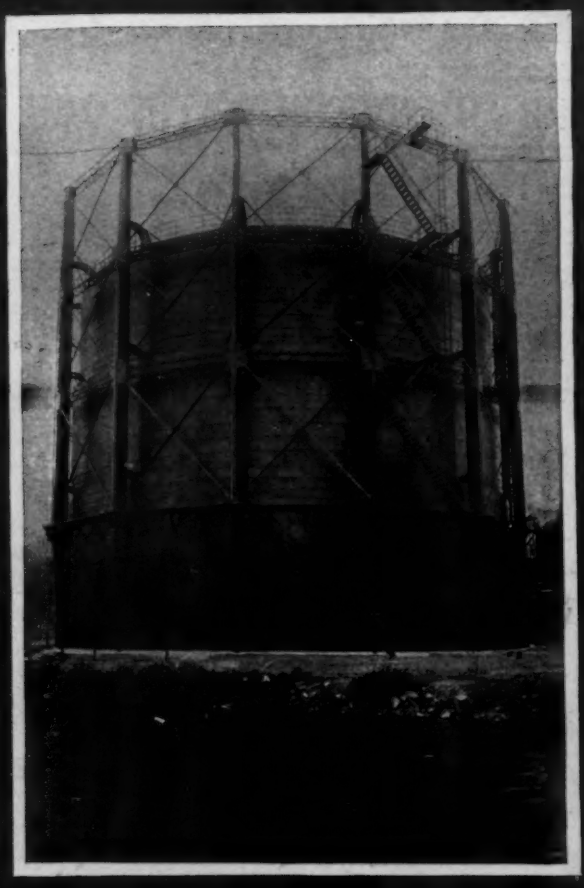

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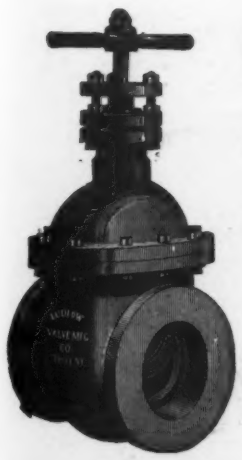

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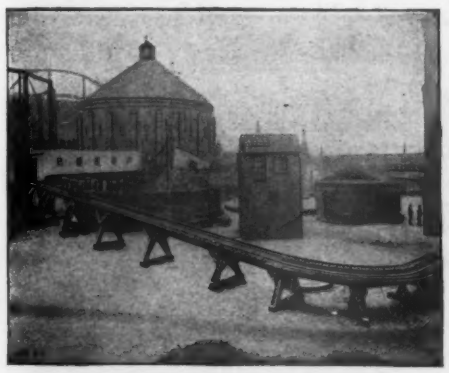

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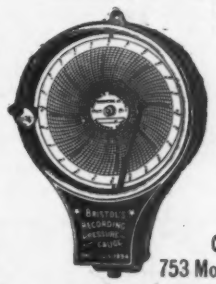

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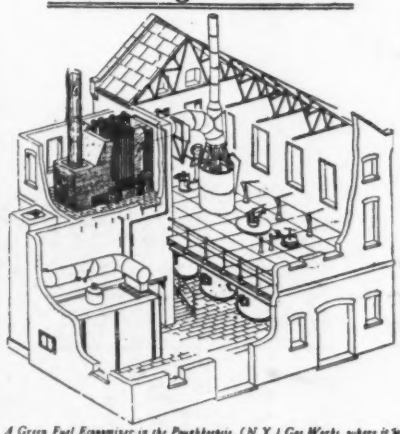

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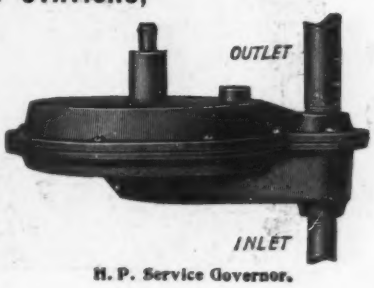

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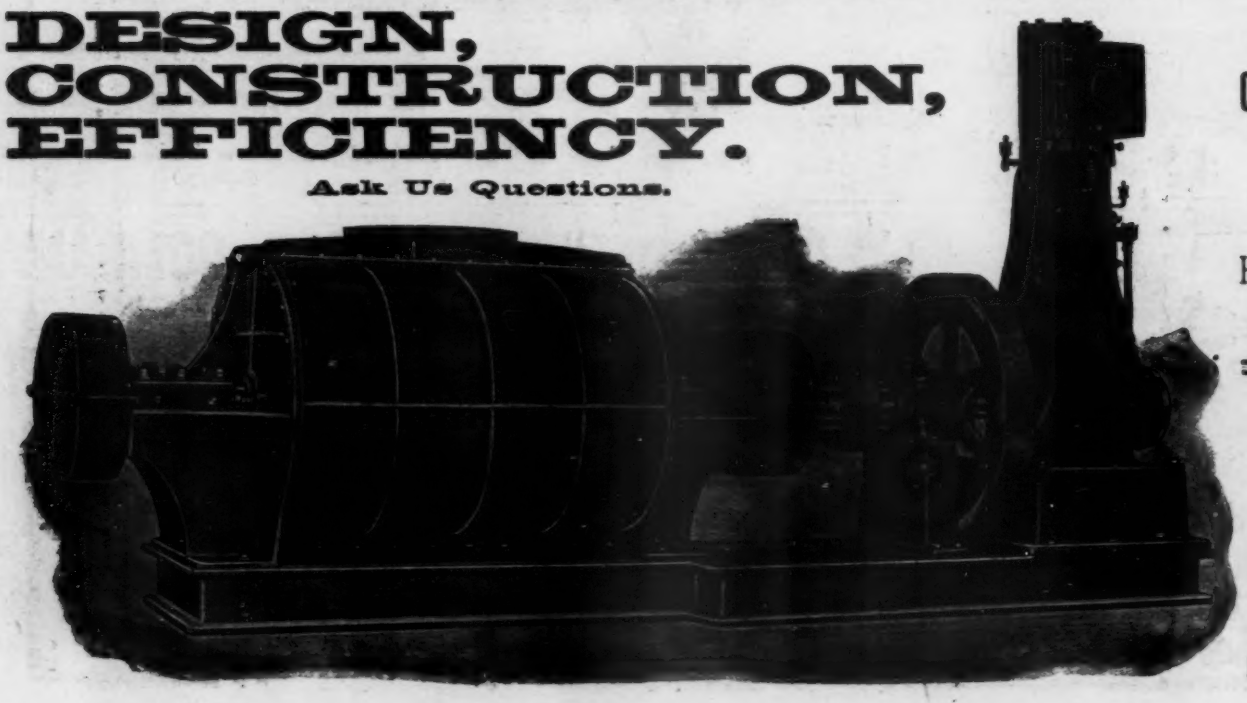

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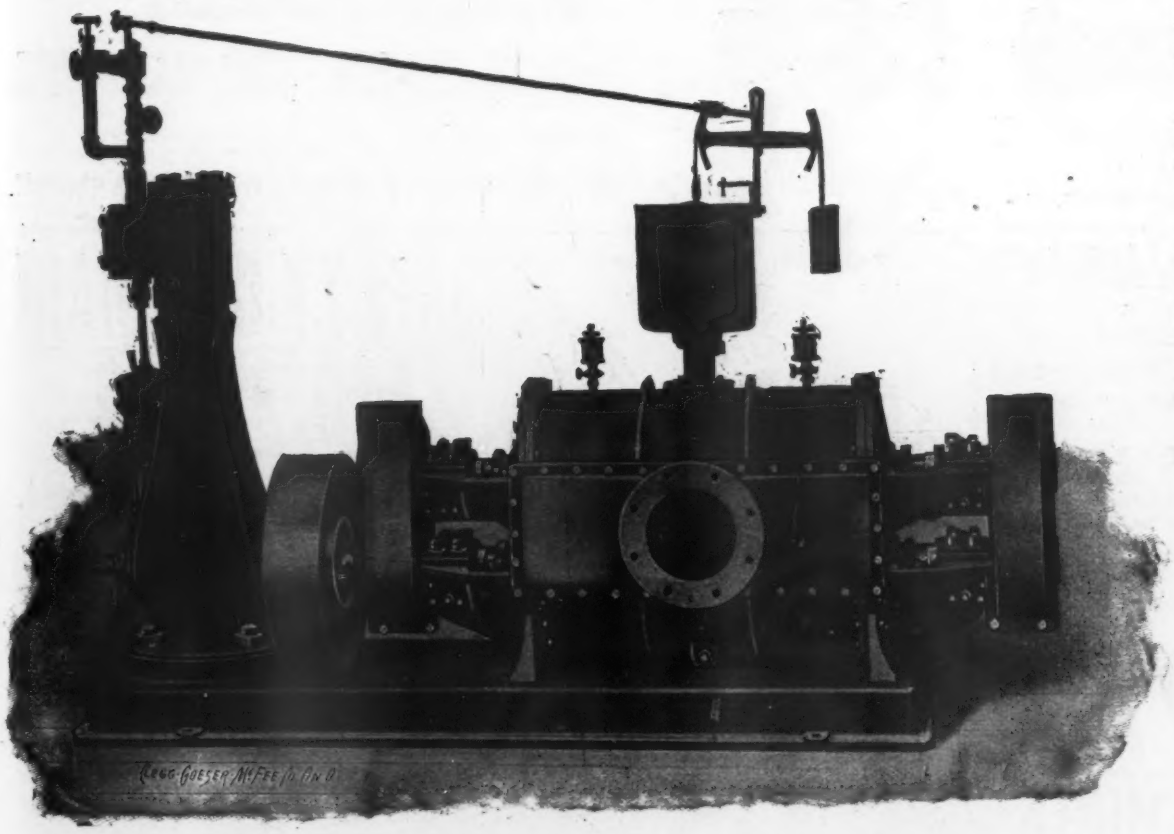

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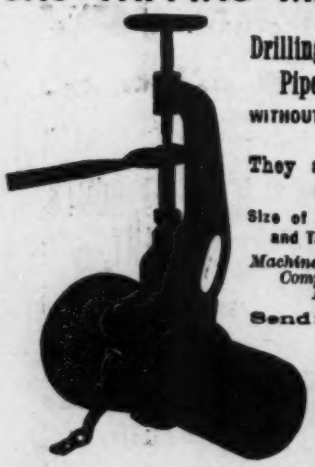

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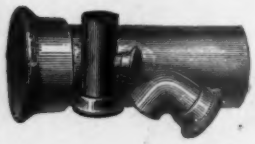

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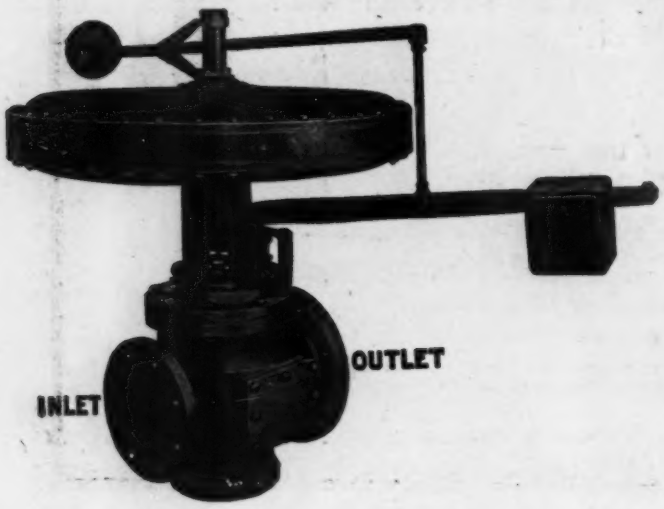

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PUBLIC LIGHTING TABLE.

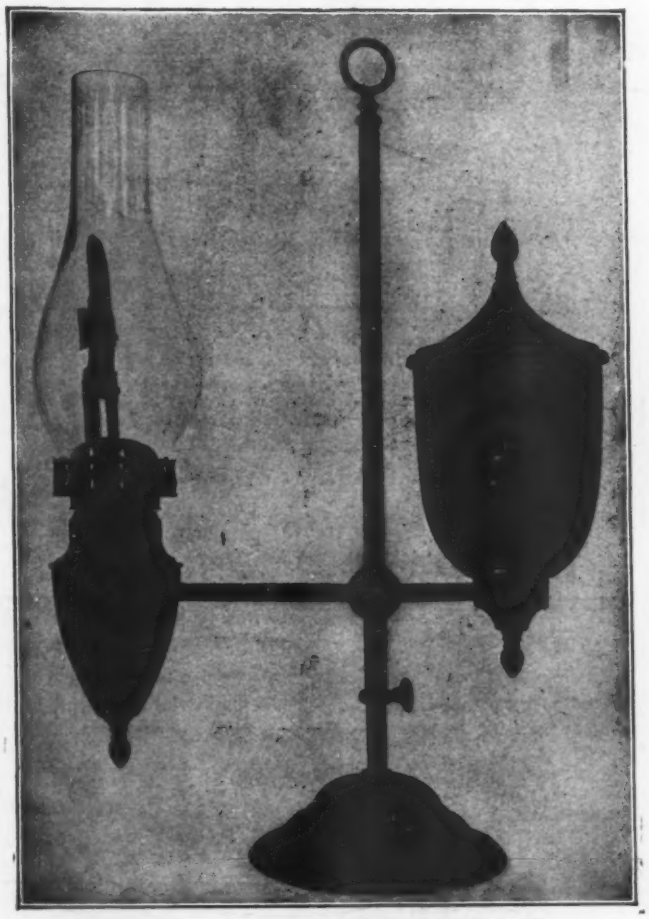
OCTOBER, 1907.

Day of Week.	Date.	Table No. 1. FOLLOWING THE MOON. Light.	Extinguish.
Tue.	1	6.10 PM	1.50 AM
Wed.	2	6.10	2.50
Thu.	3	6.10	5.00
Fri.	4	6.10	5.00
Sat.	5	6.10	5.00
Sun.	6	6.00 NM	5.00
Mon.	7	6.00	5.00
Tue.	8	6.00	5.00
Wed.	9	6.00	5.00
Thu.	10	6.00	5.00
Fri.	11	7.30	5.00
Sat.	12	8.20	5.00
Sun	13	9.20 FQ	5.10
Mon.	14	10.30	5.10
Tue.	15	11.30	5.10
Wed.	16	12.40 AM	5.10
Thu.	17	1.50	5.10
Fri.	18	3.00	5.10
Sat.	19	No L.	No L.
Sun.	20	No L FM	No L.
Mon.	21	No L.	No L.
Tue.	22	5.40 PM	7.20 PM
Wed.	23	5.40	7.50
Thu.	24	5.40	8.30
Fri.	25	5.40	9.10
Sat.	26	5.40	10.00
Sun.	27	5.30	10.50
Mon.	28	5.30 LQ	11.40
Tue.	29	5.30	12.40 AM
Wed.	30	5.30	1.40
Thu.	31	5.30	2 40

TOTAL HOURS DURING 1907.

By Table No. 1.

	Hrs.Min.
January	211.10
February	193.40
March	182.10
April	167.00
May	157.00
June	145.30
July	151.50
August	162.30
September	175.30
October	202.40
November	209.30
December	231.50
Total, yr.	2190.20



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2d. It is remarkably steady. Will burn 24 hours continuously with less than 2 per cent. variation.

3d. It is much less dangerous than Pentane, which is a kind of gasolene.

4th. It is not easily affected by air currents in the photometer room.

5th. Since the lamp may burn continuously, the candle power of gas may be taken at any moment, if necessary. This insures steady illuminating power without waste of carburetting material.

6th. The first cost of the lamp brings it within the reach of even small gas works.

7th. Costs much less to maintain than a Pentane lamp or sperm candles doing the same service.

8th. Is not affected by the weather.

PUBLIC LIGHTING TABLE.

OCTOBER, 1907.

Day of Week.	Date.	Table No. 2. NEW YORK CITY. All Night Lighting. Light.	Extinguish.
		P. M.	A.M.
Tue.	1	5.30	5.00
Wed.	2	5.30	5.00
Thu.	3	5.30	5.00
Fri.	4	5.30	5.00
Sat.	5	5.30	5.00
Sun.	6	5.30	5.00
Mon.	7	5.30	5.00
Tue.	8	5.20	5.10
Wed.	9	5.20	5.10
Thu.	10	5.20	5.10
Fri.	11	5.20	5.10
Sat.	12	5.20	5.10
Sun.	13	5.20	5.10
Mon.	14	5.20	5.10
Tue.	15	5.10	5.20
Wed.	16	5.10	5.20
Thu.	17	5.10	5.20
Fri.	18	5.10	5.20
Sat.	19	5.10	5.20
Sun.	20	5.10	5.20
Mon.	21	5.10	5.20
Tue.	22	5.00	5.30
Wed.	23	5.00	5.30
Thu.	24	5.00	5.30
Fri.	25	5.00	5.30
Sat.	26	5.00	5.30
Sun.	27	5.00	5.30
Mon.	28	5.00	5.30
Tue.	29	4.45	5.35
Wed.	30	4.45	5.35
Thu.	31	4.45	5.35

TOTAL HOURS DURING 1907.

By Table No. 2.

	Hrs.Min.
January	423.20
February	355.25
March	355.35
April	298.50
May	264.50
June	234.25
July	243.45
August	280 25
September	321.15
October	374.30
November	401.40
December	433.45
Total, yr.	3987.45

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Syracuse, N. Y. (2d contract).
Atlanta, Ga. (3d contract).
Holyoke, Mass.
Peoria, Ills.
Schnectady, N. Y. (2d contract).
Danbury, Conn.
Galveston, Tex. (2d contract).
Quebec, Canada.
Indianapolis, Ind. (2d contract).
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Waterbury, Conn. (5th contract).
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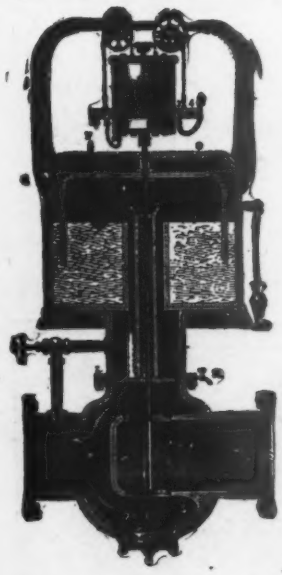

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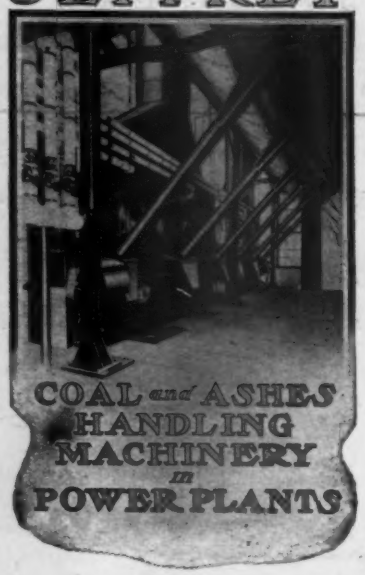

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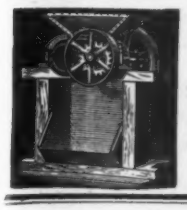

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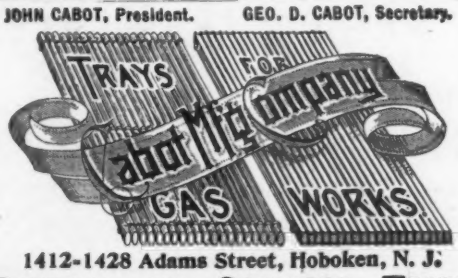

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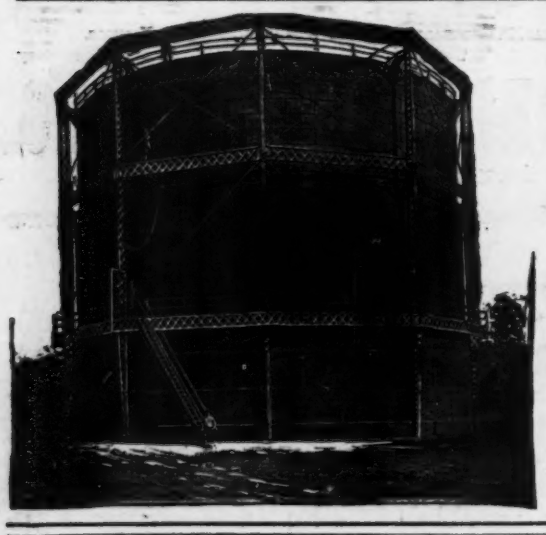

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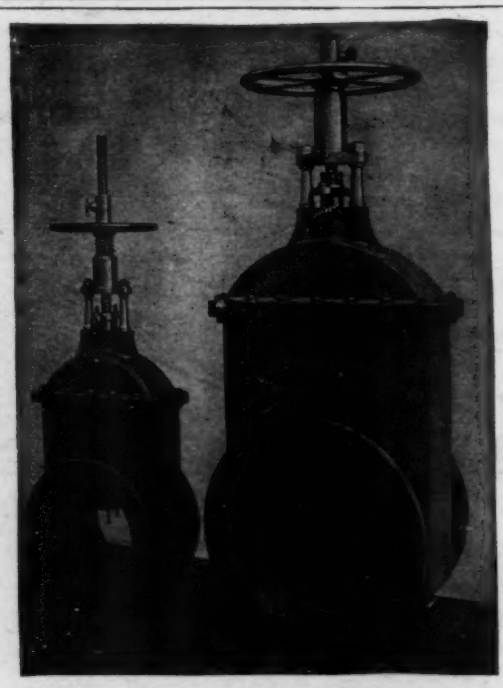

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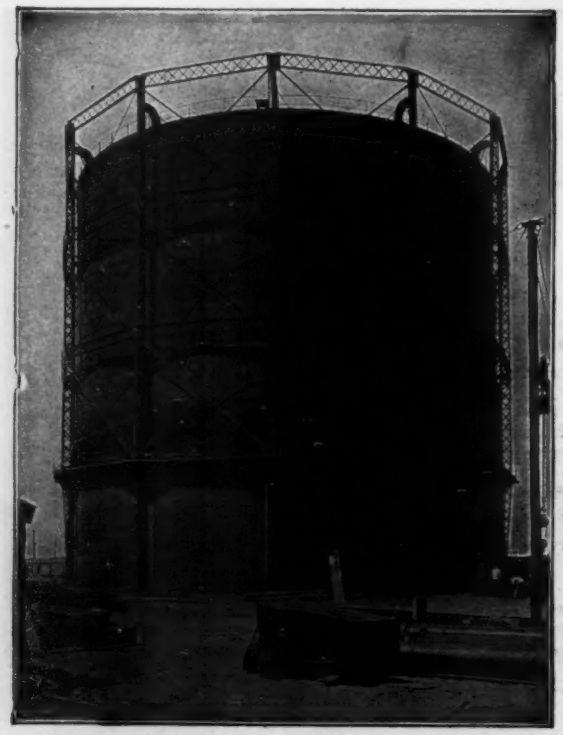

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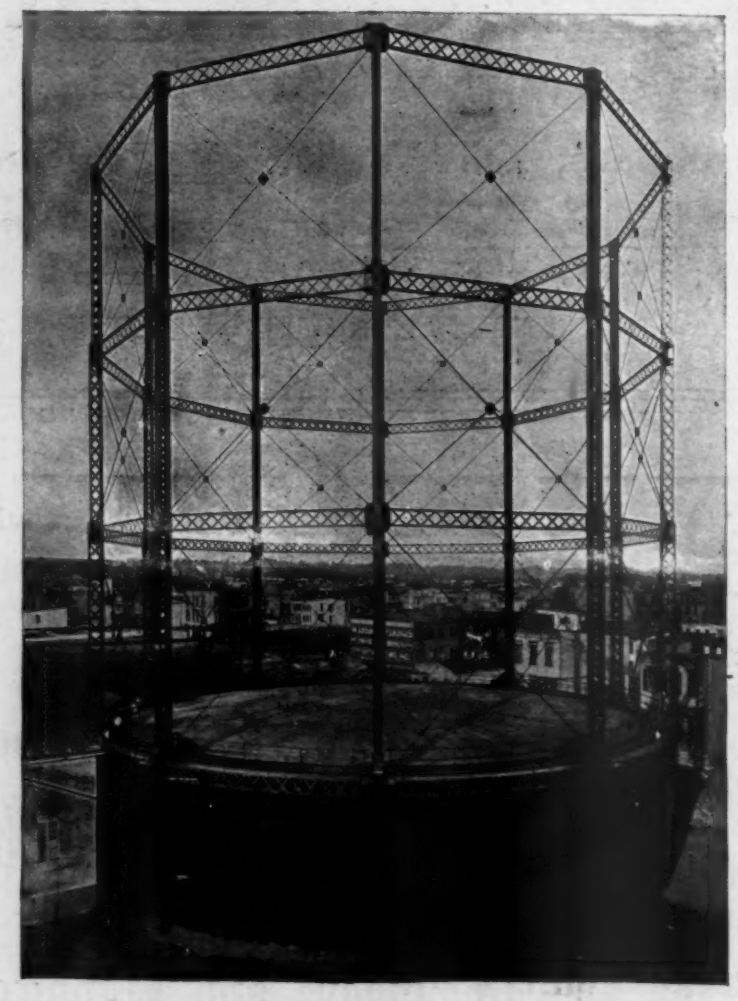

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